REMEDIAL INVESTIGATION/ FEASIBILITY STUDY WORK PLAN

LENZ OIL SERVICE, INC.
LEMONT, ILLINOIS

REVISION: 3

SUBMITTED BY:

LENZ OIL SETTLING RESPONDENTS

NOVEMBER 12, 1990

PREPARED BY:

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ERM PROJECT NO.: 9292

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EXECUTIVE SUMMARY

This Work Plan has been prepared to guide the Remedial Investigation/Feasibility Study (RI/FS) for the Lenz Oil site located in Lemont, Illinois. The primary objective of the RI is to characterize the type, extent, and migration of contamination attributable to past operations at the Lenz Oil site. The primary objective of the FS is to develop and evaluate remedial alternatives based on the results of the RI.

The Work Plan is designed to conduct the RI in a phased approach, with results presented in technical memoranda at the conclusion of each major RI task. Modifications to the proposed scope of work that are consistent with the specific objectives of the Lenz Oil site RI/FS will be evaluated based on these technical memoranda.

The Work Plan describes the site background, the technical approach to site investigation and FS activities, and the scope of work for conducting the RI/FS at the Lenz Oil site. Operational plans that address specific issues of project execution have been prepared as supporting documents. These documents include: (1) a Field Sampling Plan, (2) a Quality Assurance Project Plan, (3) a Health and Safety Plan, and (4) a Data Management Plan.

The iterative, phased approach to be implemented for this RI/FS will ensure efficiency in site investigations and will provide multiple review/evaluation points to modify the scope of work, as appropriate. This approach will maximize the utility of data

collected for the study and aid in early identification of data deficiencies or needs that may result in a change to the scope of subsequent field investigations.

The initial phase of RI field work will involve a soil gas survey in the downgradient portion of the site to provide preliminary information on contaminant migration in ground water. Subsequent RI field work tasks will include collection of a minimum of 57 source characterization samples from the site process areas and from documented or suspected areas of significant soil contamination. Six surface water samples and six sediment samples will be collected from the drainage ditch northwest of the site to assess potential migration of contaminants in the ditch. Soil on both sides of the drainage ditch will be evaluated through the collection of 12 soil samples. In addition, 23 ground water samples will be collected from on- and off-site monitoring wells during the hydrogeologic investigation to assess the migration of contaminants via ground water. Appropriate, off-site private wells will be sampled, as provided in the Phase II Work Plan and as approved by IEPA and U.S. EPA, to assess the endangerment to public health and possible off-site migration of contaminants. Since available information indicates no significant migration of contaminants via the air route, the collection and analysis of air samples has not been proposed for Phase I. The need for and scope of additional investigative phases will be based on the results of Phase I.

Data gathered during the RI will be used to prepare an Endangerment Assessment for the site. The demographic, physical, chemical and biological factors at the site will be used to evaluate the risk to

public health or the environment in the absence of any remedial actions.

The FS will include an initial screening of candidate remedial alternatives (as provided by the RI) and a subsequent detailed evaluation of selected alternatives. Initial screening and detailed evaluation of the remedial alternatives will be based on USEPA "Guidance on Conducting Remedial Investigations and Feasibility Studies Under CERCLA" (OSWER Directive 9355.3-01, October 1988).

1.0 INTRODUCTION

This Work Plan for the Lenz Oil Site Remedial Investigation and Feasibility Study (RI/FS) has been developed and is being submitted in accordance with the requirements of the Administrative Order by Consent, with an effective date of November 23, 1989, between the USEPA, IEPA and the Lenz Oil Settling Respondents. Environmental Resources Management-North Central, Inc. (ERM-North Central) has been retained by the Lenz Oil Settling Respondents to conduct the RI/FS. Pace Laboratory and Applied Research and Development Laboratory (ARDL) will perform chemical analyses as part of the RI/FS. ARDL will perform all Contract Laboratory Program (CLP) Target Compound List (TCL) and Target Analyte List (TAL) analyses on all ground water, surface water, soil, sediment, and private well samples obtained during the RI. Pace Laboratory will perform CLP analyses on all soil gas samples. ATEC Associates, Inc. (Indianapolis, Indiana) will perform laboratory geotechnical analyses on soils using either ASTM or other standard methods as appropriate.

The purpose of this RI/FS is to evaluate the extent and magnitude of on-site contamination and contamination that has migrated off site, and based upon this RI, to develop and evaluate viable, remedial action alternative(s). Specific objectives of the RI/FS include:

- Determine the characteristics, extent, and magnitude of contamination at the site.
- Define the pathways of contaminant migration from the site.

- Define on-site physical features and facilities that could affect contaminant migration, containment, or clean-up.

- Gather information necessary to support the Agency for Toxic Substances and Disease Registry (ATSDR) Public Health Assessment, the Endangerment Assessment, and the Feasibility Study.

- Define off-site physical features, including the hydrogeologic setting, that could affect contaminant migration, containment, and clean-up.

- Develop viable remedial action alternatives.

- Evaluate and screen remedial action alternatives.

In response to these objectives, the Lenz Oil Site RI/FS will be conducted using a phased process. Data will be collected in several stages, and as the site is better characterized, subsequent data collection efforts can be focused to fill any existing gaps in the data. In this way, the scope of the overall site characterization effort can be continually updated to minimize the collection of unnecessary data and maximize the data quality.

The statement of work, which is Attachment 2 to the Administrative Order by Consent, identifies the following tasks for the RI/FS:

Remedial Investigation -

TASK 1: Description of Current Situation and Investigative Support

TASK 2: Site Investigation

TASK 3: Site Investigation Analyses

TASK 4: Bench/Pilot Testing Studies

TASK 5: Reports

TASK 6: Community Relation Support

Feasibility Study

TASK 7: Remedial Alternative Screening

TASK 8: Remedial Alternative Evaluation

TASK 9: Feasibility Study Report

The tasks indicated in the RI/FS work assignment have been incorporated and discussed in the appropriate sections of this RI/FS Work Plan. Phase I Task 1 activities will include: (1) collecting and reviewing pertinent background data, to identify potential migration pathways that will be studied in more detail during the site investigation phase of the RI, and (2) initiating

preliminary field investigations such as collection of soil gas samples. Phase 1 Task 2 of the RI will include more detailed site investigation activities such as collection of soil samples, surface water samples, sediment samples, and ground water samples. The primary focus of the site investigations will be source characterization and hydrogeological investigations. Samples that will be generated for CLP laboratory analyses during this phase of the RI will include those for ground water, surface water, soil, soil gas, and sediment.

2.0 SITE BACKGROUND AND SETTING

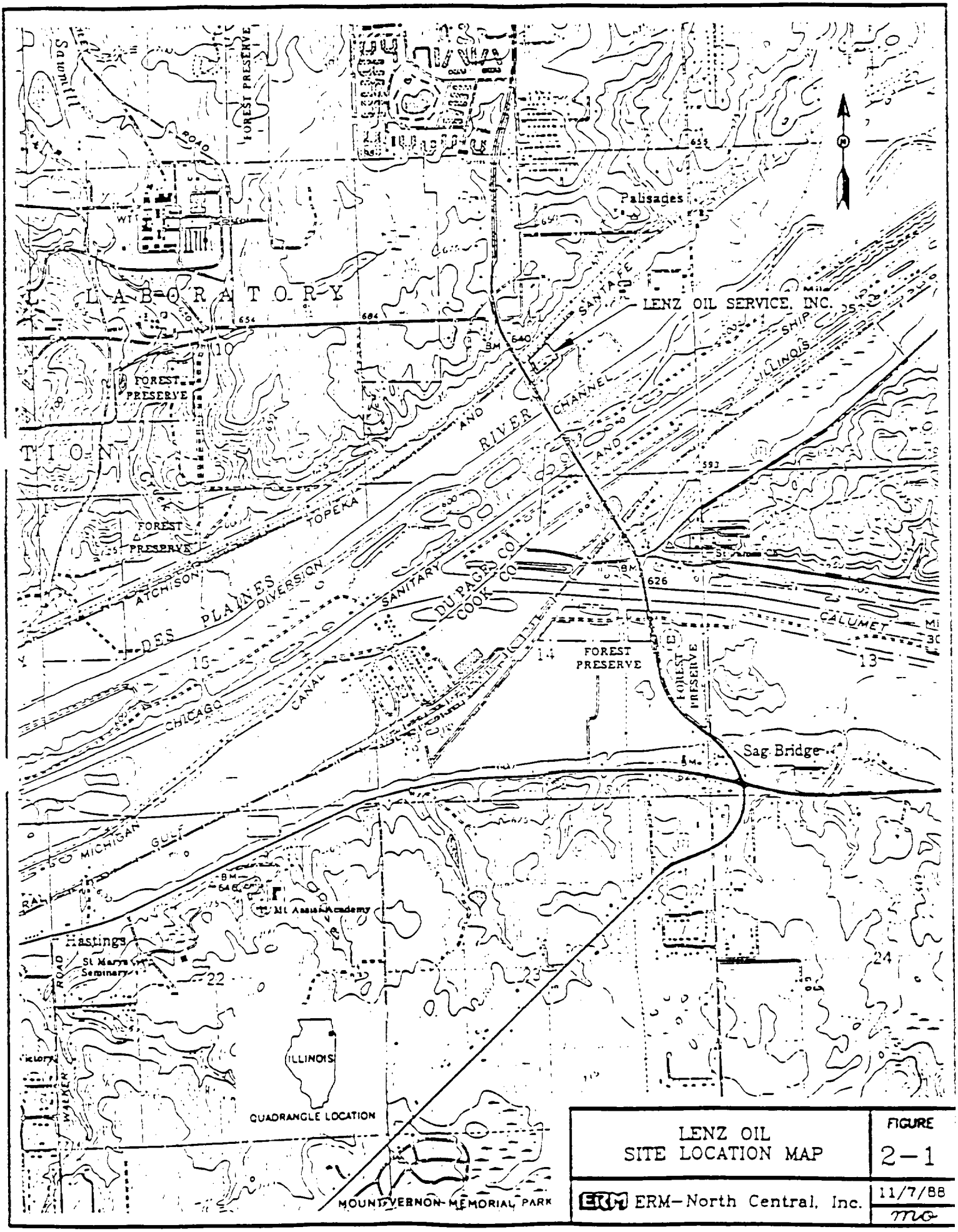
2.1. Site Location

The Lenz Oil Service, Inc. (Lenz Oil) site is situated northeast of the intersection of Illinois Route 83 and Jeans Road in southeastern DuPage County, Illinois, approximately 3.5 miles northeast of the center of Lemont, Illinois (Figure 2-1). The site is located in the SE 1/4, Section 11, T37N, R11E, of the Sag Bridge, 7.5-minute quadrangle. Lenz Oil is bordered by the Atchison, Topeka and Santa Fe Railroad to the northwest, Illinois Route 83 to the southwest, and private residences and small businesses to the southeast and northeast.

2.2 Site Description

The Lenz Oil site is located in the Des Plaines River floodplain at the foot of a 75-foot bluff, which defines the northern edge of the river valley. A small topographic high is situated southwest of the site, and the Des Plaines River Diversion Channel is approximately 600 feet to the southeast. The regional slope is toward the Des Plaines River (southeast), but the on-site slope is toward the northwest. A small, southwest-flowing ephemeral drainage ditch is situated along the northwest border of the site. Current site topography is a result of the placement of incinerated soil and regrading of the site by IEPA following the Expedited Remedial Action (ERA) completed in 1988.

Remediation activities have changed the physical appearance of the 4.5 acres site. Prior to remediation, the following features were located on the site: a wood-frame office building, a concrete block maintenance building, a concrete block parking shed, a metal



LENZ OIL SITE LOCATION MAP	FIGURE 2-1
ERM ERM-North Central, Inc.	11/7/88 mo

Lenz Oil Service, Inc. submitted an application for a RCRA Part A permit to the U.S. EPA in 1980 to maintain tank storage facilities at the Lenz Oil site. An application was also submitted to the Illinois Environmental Protection Agency (IEPA) to permit the development of a waste management site on the Lenz Oil property (IEPA, 1985). On July 5, 1981, the IEPA granted Lenz Oil Service, Inc., Permit No. 1981-36-DE to operate a storage and transfer facility for waste oils and solvents (IEPA, 1981). Due to reported ground water contamination, special conditions in the IEPA permit required Lenz Oil Service, Inc., to assess the extent of ground water contamination caused by oils and grease at the site and submit a plan to: (1) limit further degradation and (2) upgrade the quality of ground water in the area (IEPA, 1981). Although Lenz Oil Service, Inc., installed two monitoring wells on the site, there is no evidence indicating that a ground water contamination study was conducted (Soil Testing Service, 1981).

After numerous permit violations involving: (1) manifest infractions, (2) inadequate waste handling practices, and (3) reported releases of hazardous waste to local ground water and surface water systems, the IEPA referred a lawsuit to the Illinois Attorney General's Office in May 1985 (IEPA, 1985). The suit, alleging mismanagement of hazardous waste at the Lenz Oil facility, was filed in DuPage County Circuit Court. In June 1985, the court ordered Lenz Oil Service, Inc., to initiate immediate cleanup actions and to file a site cleanup plan and a site closure and compliance plan (IEPA, 1985). After failing to carry out major portions of the court order, the company and its owner, Charles Russell, filed bankruptcy. In November, 1985, operations essentially ceased at the site, which was abandoned soon thereafter (IEPA, 1985).

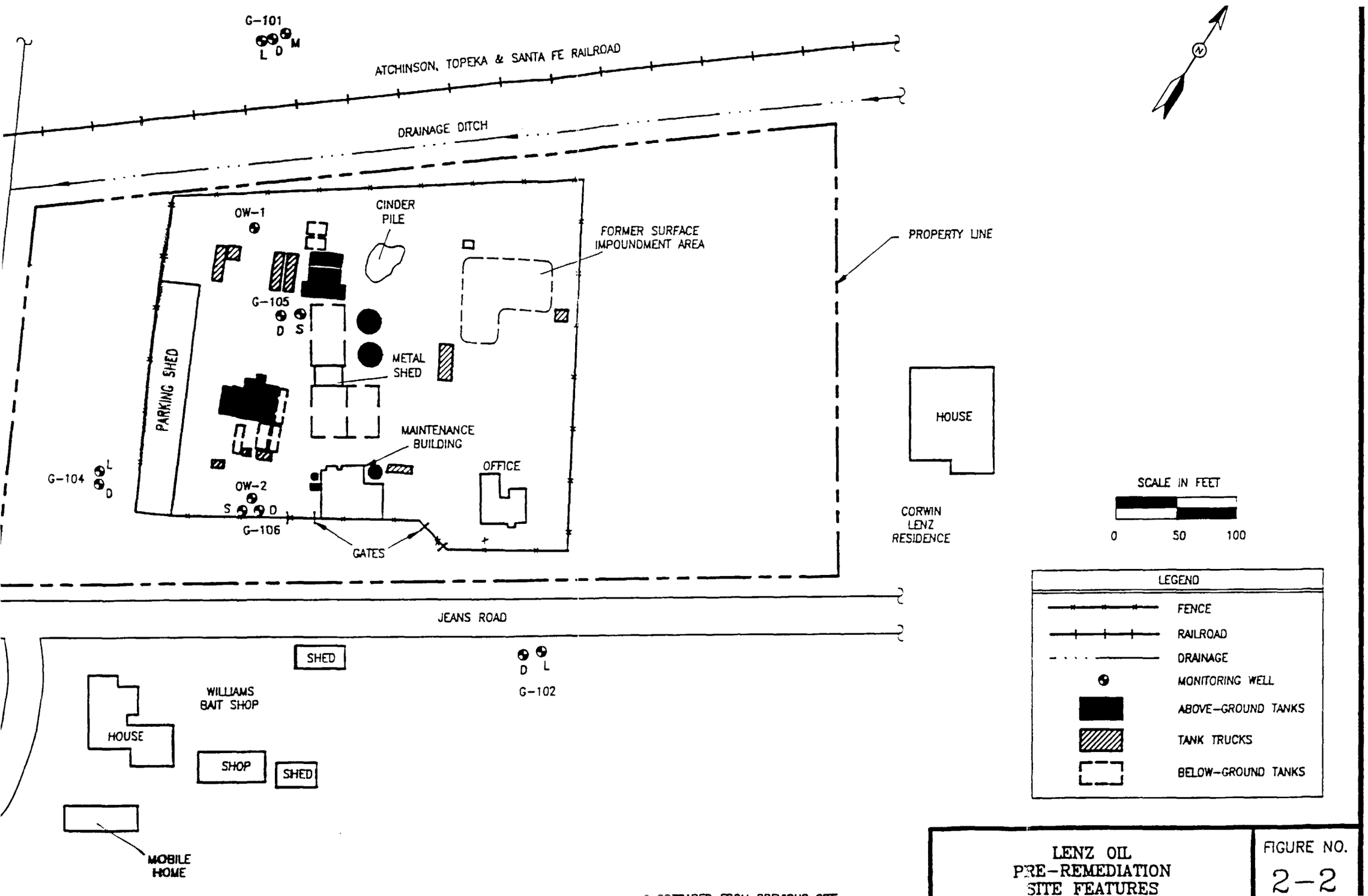
The IEPA and its contractors (Wehran Engineering Corp. and PetroChem Services, Inc.) initiated a site investigation of the Lenz Oil facility in June 1986 (Wehran Engineering, 1987). The following tasks were completed during this investigation:

- On-site drums, tanks, and tank trucks were inventoried, sampled, and secured. Sample analyses indicated that the contents of the drum were predominantly oils, solvents, and tar waste; the contents of the tank and tank trucks were oils and solvents.

- The site was surveyed with a magnetometer and a metal detector to identify buried objects such as piping systems and drums. A few small anomalies were identified, but the precise dimensions of the anomalies could not be determined and the buried objects were not identified.

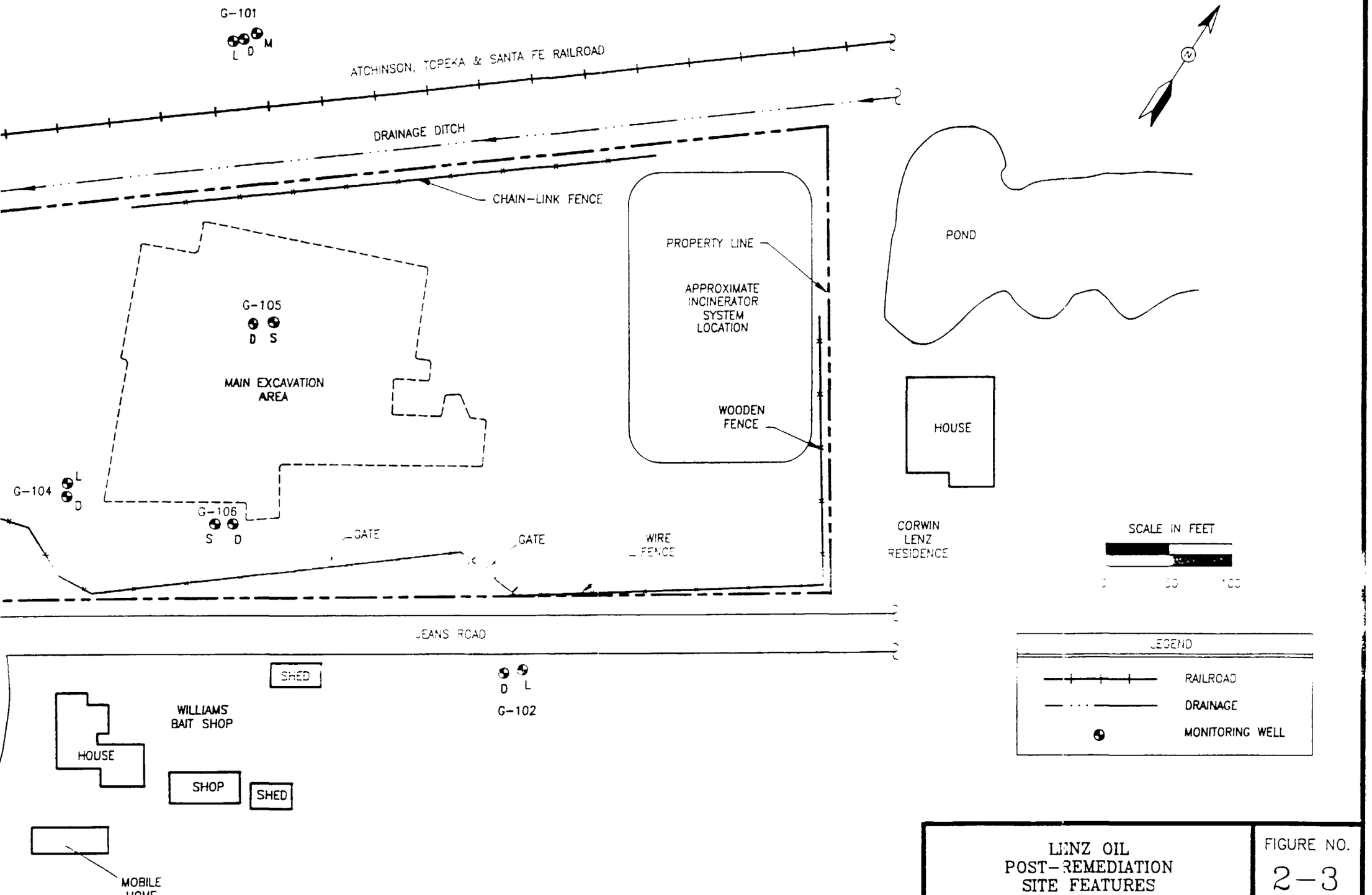
- Numerous surface and subsurface soil samples were collected and analyzed for organic compounds. Organic contaminants including solvents and petroleum-based products were detected in the soils at concentrations up to 2,000 ppm.

- Eleven (11) monitoring wells, arranged in five clusters, were installed to evaluate the hydrogeology of the site and assess the ground water quality at several intervals ranging from 8 to 38 feet below ground level. Ground



LENZ OIL
PRE-REMEDIATION
SITE FEATURES

FIGURE NO.
2-2



LENZ OIL
POST-REMEDIATION
SITE FEATURES

FIGURE NO.
2-3

water samples contained 1,1-dichloroethane (200 ppb), cis-1,2-dichloroethene (460 ppb), toluene (1,000 ppb), 2-butanone (13,700 ppb), total PCBs (200 ppb), dimethyl naphthalene (100 ppb) and several other organic compounds at lesser concentrations.

Based on the preceding results, the IEPA determined the site required expedited remedial activities (ERA). A mobile rotary kiln incinerator operated by ENSCO was set up at the site to incinerate the liquid waste and contaminated soil. According to Janssen (1988), the ERAs were completed in July, 1988 and consisted of the following:

- All drum, tank, and tank truck contents were incinerated.
- The drums were shredded and incinerated; the tanks and tank trucks were emptied, decontaminated, and transported off site.
- All above-ground and below-ground structures were removed.
- Soil in the vicinity of the underground storage tanks and buried drums was excavated to a depth of 9 to 11 feet (i.e., the top of bedrock) and incinerated (see Main Excavation Area, Figure 2-3).
- Hot spots in the area of the former surface impoundments were excavated and incinerated.

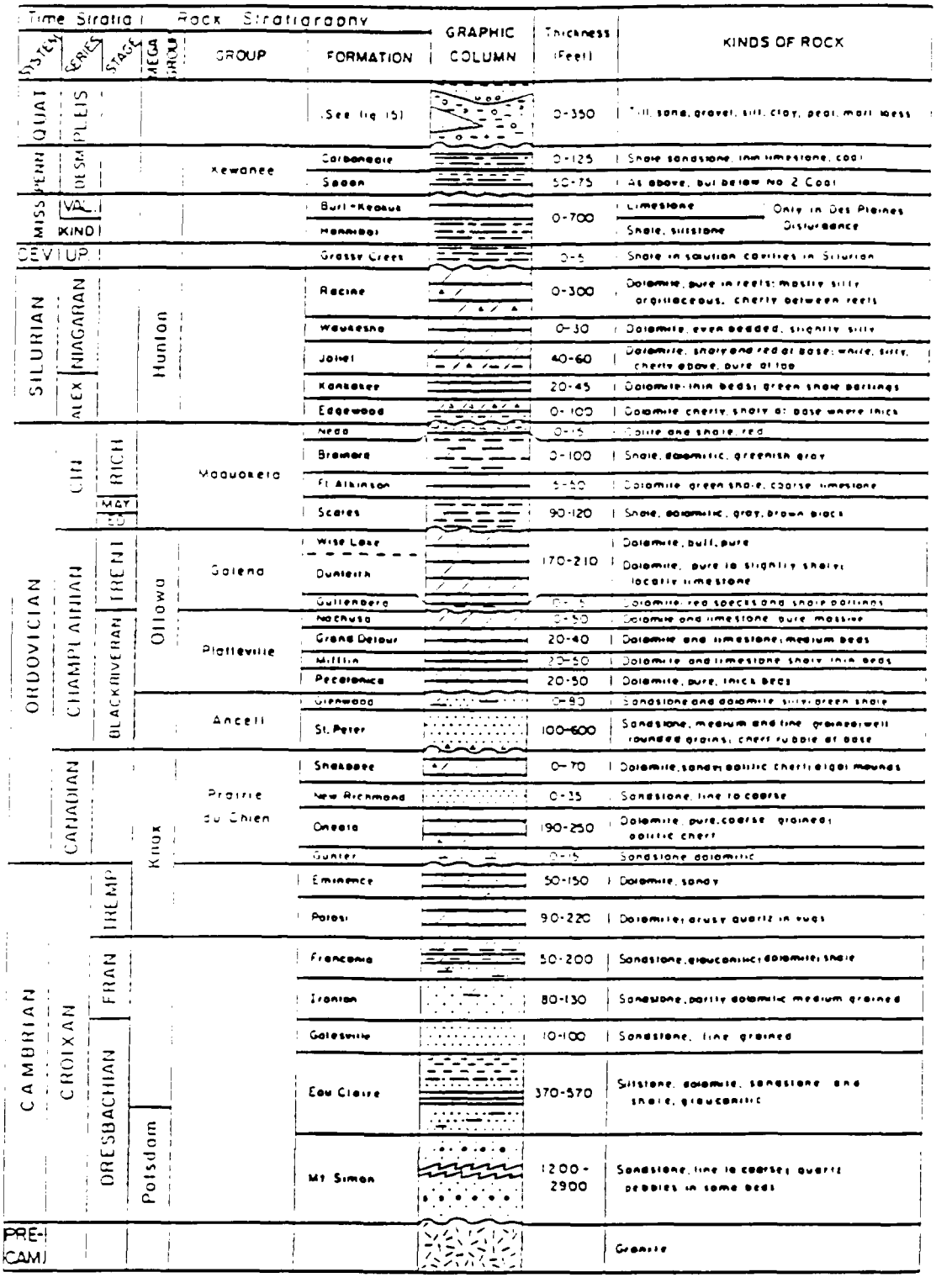
- A total of 21,000 tons of contaminated soil were excavated, incinerated, and returned to the area excavated.

- In April 1988, municipal water was made available to residences on Jeans Road and all residences formerly using private wells in the immediate vicinity of the site.

In October, 1984, the IEPA identified the Lenz Oil Service, Inc., site as a potential hazardous waste site to the U.S. EPA in the form of a Preliminary Assessment and Site Inspection (U.S. EPA, 1984). U.S. EPA proposed that the Lenz Oil site be included on the National Priorities List (NPL) in June 1988 with a hazard ranking score of 42.33. The NPL listing became final in September 1989.

2.4 Geology

The geology of southeastern DuPage County consists of a thick sequence of Silurian bedrock overlain by Quaternary glacial drift and alluvial deposits (Figure 2-4). The Silurian bedrock is predominantly dolomite with minor shale beds (Willman, 1971), and the lower part of the system consists of laterally continuous dolomite and shale referred to as the Alexandria Series (Willman, 1971). This Series ranges in thickness from 20 to 150 feet and progressively changes from argillaceous dolomite in the lower part to medium-grained dolomite with chert nodules in the upper part (Willman, 1971). The overlying Niagaran Series is a laterally extensive, well-bedded, silty, and argillaceous dolomite at the base and exceptionally pure dolomite reefs surrounded by well-bedded, argillaceous, and silty dolomite at the top (Willman, 1971). The uppermost Niagaran dolomites were eroded by glaciation



GENERALIZED STRATIGRAPHIC COLUMN FOR THE CHICAGO AREA FROM WILLMAN, 1971

FIGURE 2-4

ERM ERM-North Central, Inc.

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in southeastern DuPage County, but the lower portion of the Series crops out in the Des Plaines River bluffs near the Lenz Oil site (Willman, 1971). The Niagaran dolomites are the uppermost bedrock beneath the site.

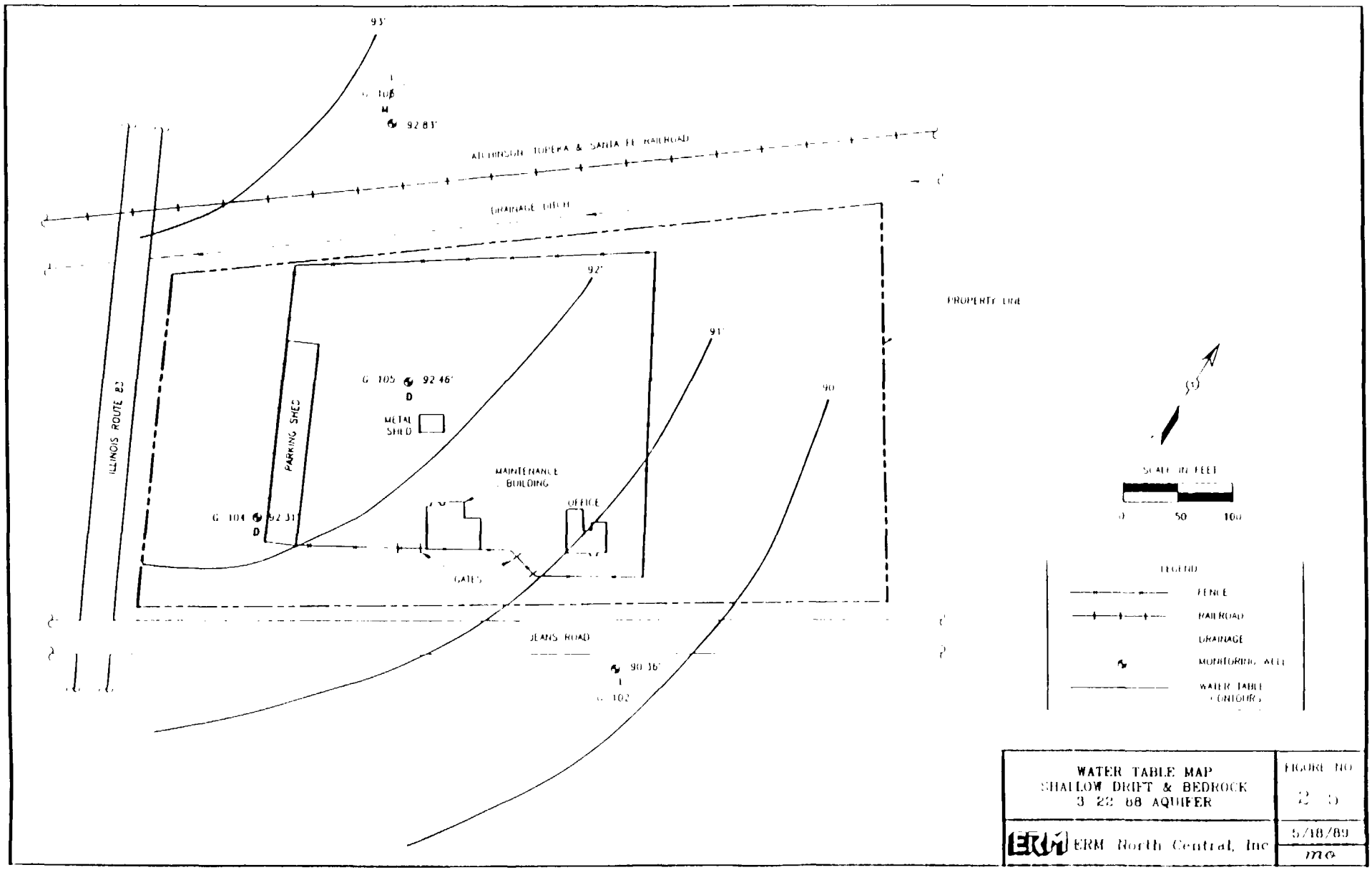
The bedrock surface in the area of the Lenz Oil site is an irregular plain, most of which was shaped by Pleistocene glacial erosion (Willman et al., 1975). Deep valleys (up to 150 feet) were cut during a major deglaciation period and were later filled with Wisconsinan glacial drift. In southeastern DuPage County, the drift consists primarily of the Wadsworth Till Member of the Wedron Formation, which is a silty and pebbly clay till with local beds of sandy to gravelly moraine deposits (Willman and Lineback, 1970). A glacial sluiceway (an erosional channel) is located northwest of the Lenz Oil site and trends northeast/southwest (Willman and Lineback, 1970). The sluiceway contains sand and gravel bar deposits of the Henry Formation. Alluvium from the Des Plaines River comprises much of the surficial geology southeast of the site. The alluvium is generally poorly sorted silt and sand with local deposits of sandy gravel (Willman and Lineback, 1970).

Soil borings at the Lenz Oil site encountered gravelly silt and silty gravel with varying amounts of sand and clay directly above the Silurian dolomite (Wehran Engineering, 1987). These deposits were interpreted as glacial outwash by the IEPA Physical Measurement Unit. The site is reportedly located on the northern edge of a glacial outwash channel formed during the Wisconsin period. A thin layer of windblown silt covers the surface of the site. Based on well logs prepared by the IEPA, the depth to bedrock ranges from 6 to 25 feet below ground surface at the site. The bedrock is rubbly at the top and fractured throughout the interval encountered.

2.5 Hydrogeology

The aquifer of concern in the study area is composed of the unconsolidated sand and gravel deposits and the underlying shallow dolomite. These two units are probably hydraulically interconnected via a series of fractures, joints, and possibly solution cavities in the dolomite. Exposures of the dolomite show that fracture and joints in the upper portion of the unit are common and generally have been enlarged by weathering and solution processes to a greater extent than fractures deeper in the unit (Zeizel et al., 1962). Because this is commonly believed to be the most productive interval in the dolomite aquifer, most residential wells in the vicinity of the site are set in the uppermost 60 feet of the dolomite.

Water level data from the Lenz Oil site indicate that the aquifer of concern is an unconfined water table aquifer and that the site is located in a recharge area. Water table elevations shown on Figure 2-5 indicate ground water flow is generally toward the east-southeast. Seasonal variations in water table elevations due to changes in the Des Plaines River stage affect the local flow gradient and possibly the direction of ground water flow. Water level measurements were collected by IEPA, or its contractor on June 4, 1986; November 17, 1986; January 6, 1988; and March 2, 1988. Of these four rounds of water level measurements, three rounds showed that ground water flow was toward the east-southeast and that the monitoring wells in cluster G-101 were upgradient of the site. An anomalously high water level was recorded for cluster G-105 during the January 6, 1988 round of measurements, which indicated that ground water was mounded around location G-105 and flow was radial from the site. If the water level measurement from G-105 is eliminated from the January 6, 1988 data set, the



WATER TABLE MAP SHALLOW DRIFT & BEDROCK 3 22 88 AQUIFER	FIGURE NO 2 5
ERM North Central, Inc	5/18/89 mo

resulting ground water flow direction is consistent with the other rounds of the water level measurements.

ERM believes the January 6, 1988 water level measurement from G-105 is anomalously high due to: (1) a measurement error, (2) compromised well integrity resulting from the remedial activity, or (3) induced mounding of ground water at the site resulting from remedial activity. The January 6, 1988 water level measurements are, therefore, not considered representative of site conditions.

The hydrogeology of the Site proper has also been modified by the placement of a liner in the excavation prior to replacement of the incinerator residue. If the integrity of the liner and the heat sealed seams of the liner have not been compromised, the incinerator residue has been isolated from the area ground water with the exception of precipitation percolating from above. Therefore, if the liner were to be compromised, flow between the local surficial aquifer and the replaced incinerator residue would be dependent upon the relative hydraulic heads in each unit. If the water level within the liner were greater than outside, flow would be outward. If the water level within the liner were less than outside, flow would be inward.

3.0 INITIAL EVALUATION

A preliminary conceptual site model (Figure 3-1) includes all known and suspected sources of contamination, potential routes of migration, and potential human and environmental receptors. Users of ground water and surface water are anticipated to be the primary receptors of concern for contamination attributable to the Lenz Oil site. The conceptual site model is poorly defined, because: 1) a lack of information on specific hazardous substances remaining in the on-site soil, 2) ambiguous data pertaining to ground water and surface water flow direction, and 3) a current data gap regarding potential receptors. Because of this, potential contaminant migration routes and receptors will be reevaluated during Task 1 of the RI.

3.1 Sources of Contamination

Three primary sources of contamination (drums, tanks, and tank trucks) and one secondary source of contamination (on-site soils) were identified at the Lenz Oil facility by the IEPA contractor (Wehran Engineering, 1987). The drums, tanks, and tank trucks were inventoried, and their contents were sampled and analyzed during the summer and fall of 1986. A total of 197 drums, 27 tanks, and 8 tank trucks were located and sampled. Table 3-1 lists the range of contaminant concentrations detected in these three primary sources. The data are a worst-case characterization of the primary sources, which have since been contained and incinerated. As a result, the primary sources have not contributed to further site contamination since 1986.

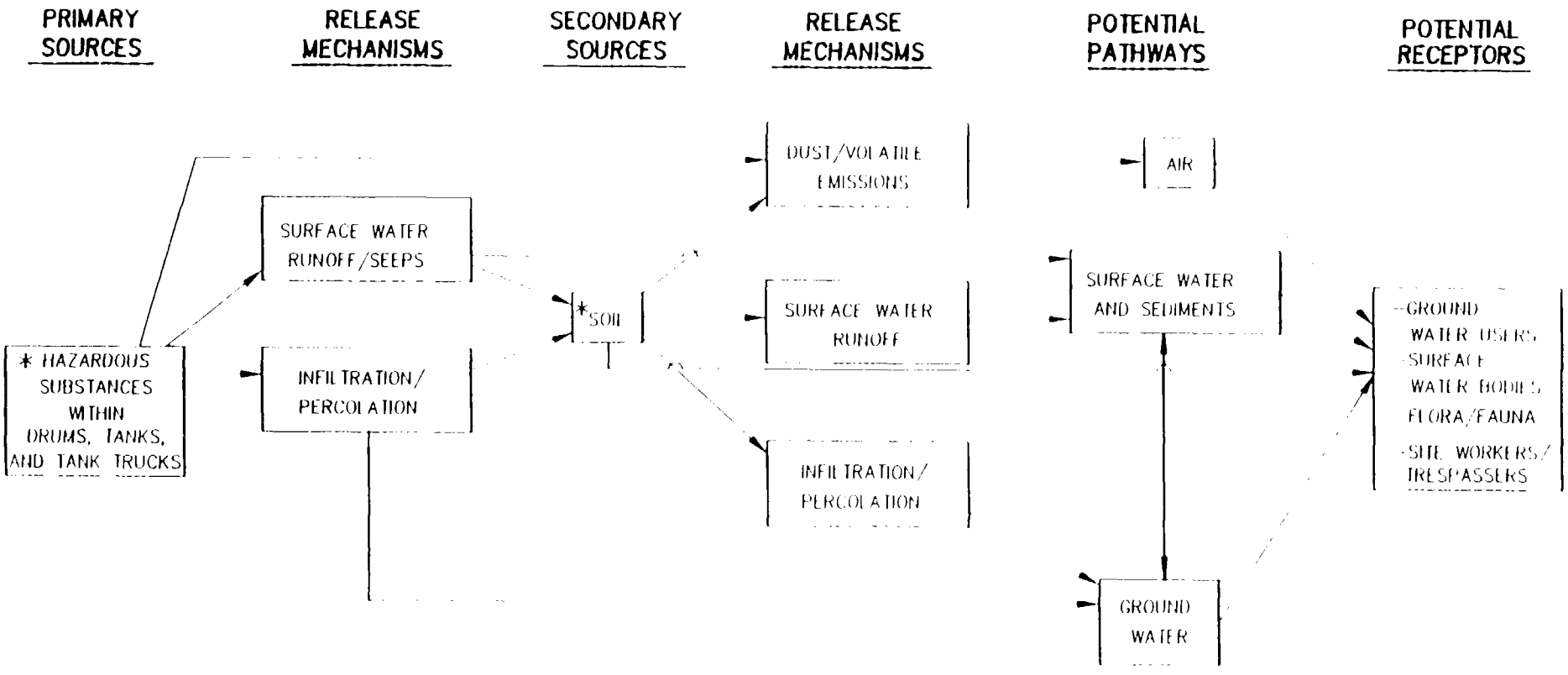
Surface and subsurface soil on the Lenz Oil site was sampled and analyzed by an IEPA contractor in 1986 (Wehran Engineering, 1987).

TABLE 3-1

REPORTED CONTAMINANTS IN LENZ OIL DRUMS, TANKS, AND TANK TRUCKS

Contaminant	Range of Concentrations Detected			Detection Limit	
Antimony	BDL -	26.2	mg/kg	0.58	mg/kg
Aroclor 1016	BDL -	25.0	mg/kg	5.0	mg/kg
Aroclor 1242	BDL -	85.0	mg/kg	5.0	mg/kg
Aroclor 1248	BDL -	62.0	mg/kg	5.0	mg/kg
Aroclor 1260	BDL -	26.0	mg/kg	5.0	mg/kg
Arsenic	BDL -	33.94	mg/kg	0.35	mg/kg
Barium	BDL -	1020.0	mg/kg	200.0	mg/kg
Beryllium	BDL -	2.5	mg/kg	2.0	mg/kg
Cadmium	BDL -	30.0	mg/kg	20.0	mg/kg
Chromium	BDL -	1235.0	mg/kg	20.0	mg/kg
Copper	BDL -	345.0	mg/kg	10.0	mg/kg
Cyanide, Reactive	BDL -	349.0	mg/kg	5.0	mg/kg
Cyanide, Total	BDL -	165.0	mg/kg	5.0	mg/kg
Lead	BDL -	2030.0	mg/kg	4.0	mg/kg
Mercury	BDL -	4.06	mg/kg	1.0	mg/kg
Nickel	BDL -	350.0	mg/kg	1.9	mg/kg
PCBs, Total	BDL -	85.0	mg/g	5.0	mg/kg
Selenium	BDL -	0.14	ug/l	0.6	mg/kg
Zinc	BDL -	6310.0	mg/kg	20.0	mg/kg
Naphthalene	BDL -	9100.0	ug/g	N/A	
Methyl Naphthalene	N/A -	4700.0	ug/g	N/A	
Dimethyl Naphthalene	N/A -	3000.0	ug/g	N/A	
Trimethyl Naphthalene	N/A -	1920.0	ug/g	N/A	
Anthracene	N/A -	510.0	ug/g	N/A	
1,1-dichloroethane	N/A -	93.0	ug/g	N/A	
1,1,1-Trichloroethane	N/A -	11,000.0	ug/g	N/A	
Trichloroethylene	N/A -	5,100.0	ug/g	N/A	
Benzene	N/A -	16,000.0	ug/g	N/A	
Tetrachloroethylene	N/A -	7,900.0	ug/g	N/A	
Toluene	N/A -	45,000.0	ug/g	N/A	
Ethyl Benzene	N/A -	33,000.0	ug/g	N/A	
Xylene	N/A -	77,100.0	ug/g	N/A	
Phenol	N/A -	54,000.0	ug/l	N/A	
2,4-dimethylphenol	N/A -	4,800.0	ug/l	N/A	

NOTE: BDL - Below Detection Limit
N/A - Not Available



* SOURCES REMEDIATED BY IEPA BETWEEN 1986 AND 1988. RESIDUAL CONTAMINATION MAY REMAIN IN SOIL

PRELIMINARY CONCEPTUAL SITE MODEL LENZ OIL SITE	FIGURE 3 1
ERM ERM-North Central, Inc.	1/19/90

Sample results indicated that the soil contained many of the same contaminants detected in the primary sources (drums, tanks, and tank trucks), but generally at lower concentrations. As previously mentioned, the IEPA addressed remediation of the on-site soil beginning in 1986. The remediation effort was completed in October 1988 and from that time forward, there has been no primary source material on the Lenz Oil site. A more thorough evaluation of the pre- and post-remediation soil sample data will be conducted during RI Phase I, Task 1.

3.2 Migration Pathways

Contaminant migration from the Lenz Oil site prior to IEPA remediation efforts would most likely have occurred via surface water and/or ground water pathways. Airborne contaminant migration is not considered likely since the primary contaminant source has been eliminated. Any direct contact and fire/explosion risks were probably eliminated by the IEPA remediation of on-site soils; however, not all of the on-site soils were remediated and the composition of the backfill is unknown.

The local ground water system is the primary migration pathway from the Lenz Oil site to be addressed during this RI/FS. Ground water samples collected from local monitoring wells and residential wells during the period from January 30, 1985 to June 22, 1988 have documented the presence of various volatile and semi-volatile organic compounds as well as PCBs (IEPA, 1988). Table 3-2 shows the wells sampled, their locations, the sampling dates, and the parameters analyzed, whereas Table 3-3 shows the range of contaminant concentrations of all organic contaminants detected in the local ground water. The analytical parameters and detection limits from previous investigations are presented on Table 3-4.

TABLE 3-2

PREVIOUS WELL SAMPLING

RESIDENCE	ADDRESS	METALS	NITRATES	VOLATILES	SEMI-VOLATILES	PCBs/PEST.	CYANIDE
Schuster	11 S. 305 Jackson Street	X	X	X	X	X	X
Gruber	Jeans Road	X	X	X	X	X	X
Williams	Jeans Road	X	X	X	X	X	X
Kempa	16 W 415 99th Street			X	X	X	
Flaks	97th Street			X	X	X	
Lenz	Route 2, Box 208	X	X	X	X	X	X
Mason	Jeans Road	X		X			
Stein Haus	Not Recorded			X			
Knowlwood	Not Recorded			X			

TABLE 3-3

REPORTED CONTAMINANTS IN LENZ OIL GROUND WATER

Contaminant	Range of Concentrations Detected	Detection Limit
Chloroethane	BDL - 112.0 ug/l	10 ug
C-1,2-dichloroethene	BDL - 460.0 ug/l	5 ug
1,2-dichloroethane	BDL - 215.0 ug/l	5 ug
1,1,1-trichloroethane	BDL - 252.0 ug/l	5 ug
Benzene	BDL - 110.0 ug/l	5 ug
Vinyl Chloride	BDL - 22.0 ug/l	10 ug
Tetrachloroethene	BDL - 7.4 ug/l	5 ug
1,1-dichloroethane	BDL - 200.0 ug/l	5 ug
Toluene	BDL - 1,000.0 ug/l	5 ug
2-butanone(methyl ethyl ketone)	BDL - 13,700.0 ug/l	10 ug
Ethylbenzene	BDL - 43.0 ug/l	5 ug
Xylene, Total	BDL - 180.0 ug/l	5 ug
PCBs, Total	N/A - 200.0 ug/l	N/A
Naphthalene	BDL - 13.0 ug/l	10 ug
Methyl Naphthalene	BDL - 47.0 ug/l	10 ug
Dimethyl Naphthalene	N/A - 100.0 ug/l	N/A
Trimethyl Naphthalene	N/A - 80.0 ug/l	N/A
Anthracene	BDL - 45.0 ug/l	10 ug
1,2-dichloroethylene	BDL - 61.0 ug/l	5 ug
Isophorone	BDL - 32.0 ug/l	10 ug
Phenol	BDL - Trace ug/l	10 ug

NOTE: BDL - Below Detection Limit
N/A - Not Available

TABLE 3-4

ANALYTICAL PARAMETERS AND DETECTION LIMITS
FROM PREVIOUS INVESTIGATIONS

PARAMETER	SOIL	SURFACE WATER	GROUND WATER	TANK & DRUM
VOLATILE ORGANICS				
Chloromethane	5.0 ug/kg		10 ug/l	
Bromomethane	5.0 ug/kg		10 ug/l	
Vinyl Chloride	5.0 ug/kg		10 ug/l	
Chloroethane	5.0 ug/kg		10 ug/l	
Methylene Chloride	5.0 ug/kg		1 ug/l	25 ug/g
Bromochloromethane	5.0 ug/kg		5 ug/l	25 ug/g
Acetone	10.0 ug/kg		10 ug/l	
Carbon Disulfide	10.0 ug/kg		5 ug/l	
1,1-Dichloroethene	5.0 ug/kg		1 ug/l	25 ug/g
1,1-Dichloroethane	5.0 ug/kg		1 ug/l	25 ug/g
Total 1,2-Dichloroethene			5 ug/l	25 ug/g
Trans-1,2-Dichloroethene	5.0 ug/kg		1 ug/l	
Cis-1,2-dichloroethane	5.0 ug/kg			
Chloroform	5.0 ug/kg		1 ug/l	25 ug/g
1,2-Dichloroethane	5.0 ug/kg		1 ug/l	25 ug/g
2-Butanone	10.0 ug/kg		10 ug/l	
1,1,1-Trichloroethane	5.0 ug/kg		1 ug/l	35 ug/g
Carbon Tetrachloride	5.0 ug/kg		1 ug/l	25 ug/g
Vinyl Acetate	10.0 ug/kg		10 ug/l	
Bromodichloromethane	5.0 ug/kg		1 ug/l	25 ug/g
1,2-Dichloropropane	5.0 ug/kg		5 ug/l	25 ug/g
cis-1,3-Dichloropropene	5.0 ug/kg		5 ug/l	
2-chloroethylvinylether	10.0 ug/kg		10 ug/l	
Trichloroethene	5.0 ug/kg		1 ug/l	35 ug/g
Dibromochloromethane	5.0 ug/kg		1 ug/l	25 ug/g
1,1,2-Trichloroethane	5.0 ug/kg		5 ug/l	
Benzene	5.0 ug/kg		1 ug/l	35 ug/g
t-1,3-Dichloropropene	5.0 ug/kg		5 ug/l	
Bromoform	5.0 ug/kg		1 ug/l	25 ug/g
4-Methyl-2-pentanone	10.0 ug/kg		10 ug/l	
2-Hexanone	10.0 ug/kg		10 ug/l	
Tetrachloroethene	5.0 ug/kg		1 ug/l	35 ug/g
1,1,2,2-Tetrachloroethane	5.0 ug/kg		5 ug/l	
Toluene	5.0 ug/kg		1 ug/l	35 ug/g
Chlorobenzene	5.0 ug/kg		1 ug/l	25 ug/g
Ethylbenzene	5.0 ug/kg		1 ug/l	35 ug/g
Stryene	10.0 ug/kg		5 ug/l	
Trichlorofluoromethane	5.0 ug/kg			
Total Xylenes	5.0 ug/kg		1 ug/l	35 ug/g
Acrolein	10 ug/g			
Acrylonitrile	10 ug/g			

TABLE 3-4 (CONT.)

ANALYTICAL PARAMETERS AND DETECTION LIMITS
FROM PREVIOUS INVESTIGATIONS

PARAMETER	SOIL	SURFACE WATER	GROUND WATER	TANK & DRUM
SEMIVOLATILE ORGANICS				
bis(2-Chloroethyl)ether	330 ug/kg	500 ug/l	5 ug/l	
2-Chlorophenol	330 ug/kg	500 ug/l	5 ug/l	150 ug/g
Dichlorobenzene			1 ug/l	
1,3-Dichlorobenzene	330 ug/kg		10 ug/l	
1,4-Dichlorobenzene	330 ug/kg		10 ug/l	
Benzyi Alcohol	330 ug/kg		10 ug/l	
1,2-Dichlorobenzene	330 ug/kg	500 ug/l	5 ug/l	150 ug/g
Bis(3-chloroethyl)ether	0.5 ug/g			150 ug/g
2-Methylphenol	330 ug/kg		10 ug/l	
bis(2-Chloroisopropyl)ether	330 ug/kg		10 ug/l	
4-Methylphenol	330 ug/kg		10 ug/l	
N-Nitroso-di-n-propylamine	330 ug/kg		10 ug/l	
Hexachloroethane	330 ug/kg		10 ug/l	
Nitrobenzene	330 ug/kg	500 ug/l	5 ug/l	150 ug/g
Isophorone	330 ug/kg	500 ug/l	10 ug/l	150 ug/g
2-Nitrophenol	0.5 ug/g	500 ug/l	5 ug/l	150 ug/g
2,4-Dimethylphenol	330 ug/kg	500 ug/l	5 ug/l	150 ug/g
Benzoic Acid	1600 ug/kg		10 ug/l	
bis(2-Chloroethoxy)methane	330 ug/kg		10 ug/l	
2,4-Dichlorophenol	330 ug/kg	500 ug/l	5 ug/l	150 ug/g
1,2,4-Trichlorobenzene	330 ug/kg	500 ug/l	5 ug/l	150 ug/g
Naphthalene	330 ug/kg	500 ug/l	5 ug/l	140 ug/g
Methyl naphthalene		500 ug/l	5 ug/l	140 ug/g
Dimethyl naphthalene		500 ug/l	5 ug/l	140 ug/g
Trimethyl naphthalene		500 ug/l	5 ug/l	140 ug/g
4-Chloroaniline	330 ug/kg		10 ug/l	
Hexachlorobutadiene	330 ug/kg	500 ug/l	5 ug/l	
4-Chloro-3-methylphenol	330 ug/kg	500 ug/l	5 ug/l	
2-Methylnaphthalene	330 ug/kg		10 ug/l	
Hexachlorocyclopentadiene	330 ug/kg	500 ug/l	5 ug/l	150 ug/g
2,4,6-Trichlorophenol	330 ug/kg	500 ug/l	5 ug/l	150 ug/g
2,4,5-Trichlorophenol	1600 ug/kg		50 ug/l	
2-Chloronaphthalene	330 ug/kg		10 ug/l	
2-Nitroaniline	1600 ug/kg		50 ug/l	
Dimethylphthalate	330 ug/kg		10 ug/l	
Acenaphthylene	330 ug/kg	500 ug/l	5 ug/l	150 ug/g

TABLE 3-4 (CONT.)

ANALYTICAL PARAMETERS AND DETECTION LIMITS
FROM PREVIOUS INVESTIGATIONS

PARAMETER	SOIL	SURFACE WATER	GROUND WATER	TANK & DRUM
SEMIVOLATILE ORGANICS				
2,6-Dinitrotoluene	330 ug/kg		10 ug/l	
3-Nitroaniline	1600 ug/kg		10 ug/l	
Acenaphthene	330 ug/kg	500 ug/l	5 ug/l	150 ug/g
Phenol	330 ug/kg	500 ug/l	5 ug/l	150 ug/g
2,4-Dinitrophenol	0.5 ug/g	500 ug/l	5 ug/l	150 ug/g
4-chloro-6-methylphenol				150 ug/g
4-Nitrophenol	0.5 ug/g	500 ug/l	5 ug/l	150 ug/g
Dibenzofuran	330 ug/kg	500 ug/l	5 ug/l	150 ug/g
2,4-Dinitrotoluene	330 ug/kg	500 ug/l	5 ug/l	150 ug/g
Diethylphthalate	330 ug/kg		10 ug/l	
4-Chlorophenylphenylether	330 ug/kg		10 ug/l	
Fluorene	330 ug/kg	500 ug/l	5 ug/l	150 ug/g
4-Nitroaniline	1600 ug/kg		50 ug/l	
4,6-Dinitro-2-methylphenol	1600 ug/kg	500 ug/l	5 ug/l	150 ug/g
N-Nitrosodiphenylamine	330 ug/kg		10 ug/l	
4-Bromophenylphenylether	330 ug/kg		10 ug/l	
Hexachlorobenzene	330 ug/kg		10 ug/l	
Pentachlorophenol	1600 ug/kg		50 ug/l	
Phenanthrene	330 ug/kg	500 ug/l	5 ug/l	140 ug/g
Anthracene	330 ug/kg	500 ug/l	5 ug/l	140 ug/g
Di-n-butylphthalate	330 ug/kg		10 ug/l	
Fluoranthene	330 ug/kg	500 ug/l	5 ug/l	150 ug/g
Pyrene	330 ug/kg	500 ug/l	5 ug/l	150 ug/g
Benzidine		500 ug/l	5 ug/l	150 ug/g
Butylbenzylphthalate	330 ug/kg		10 ug/l	
3,3'-Dichlorobenzidine	660 ug/kg	500 ug/l	5 ug/l	150 ug/g
Benzo(a)anthracene	330 ug/kg	500 ug/l	5 ug/l	150 ug/g
Chrysene	330 ug/kg	500 ug/l	5 ug/l	150 ug/g
bis(2-Ethylhexyl)phthalate	330 ug/kg		10 ug/l	
Di-n-octylphthalate	330 ug/kg		10 ug/l	
Benzo(b)fluoranthene	330 ug/kg		10 ug/l	
Benzo(k)fluoranthene	330 ug/kg		10 ug/l	
Benzo(a)pyrene	330 ug/kg		10 ug/l	
Indeno(1,2,3-cd)pyrene	330 ug/kg		10 ug/l	
Dibenz(a,h)anthracene	330 ug/kg		10 ug/l	
Benzo(g,h,i)perylene	330 ug/kg		10 ug/l	

TABLE 3-4 (CONT.)

ANALYTICAL PARAMETERS AND DETECTION LIMITS
FROM PREVIOUS INVESTIGATIONS

PARAMETER	SOIL	SURFACE WATER	GROUND WATER	TANK & DRUM
SEMIVOLATILE ORGANICS				
Methylphenol		500 ug/l		
Phenoxy ethanol		500 ug/l		
Benzene ethanol		500 ug/l		
Methylbenzene ethanol		500 ug/l		
Butoxy ethanol		500 ug/l		
Butoxy ethoxy ethanol		500 ug/l		
Ethoxy butoxy ethoxy ethanol		500 ug/l		
Other aliphatic alcohols		500 ug/l		
Phenyl Ethanone		500 ug/l		

TABLE 3-4 (CONT.)

ANALYTICAL PARAMETERS AND DETECTION LIMITS
FROM PREVIOUS INVESTIGATIONS

PARAMETER	SOIL	SURFACE WATER	GROUND WATER	TANK & DRUM
PESTICIDES/PCBS				
alpha-BHC	8.0 ug/kg			
beta-BHC	8.0 ug/kg			
delta-BHC	8.0 ug/kg			
gamma-BHC (Lindane)	8.0 ug/kg		1.0 ug/l	
Heptachlor	8.0 ug/kg		1.0 ug/l	
Aldrin	8.0 ug/kg		1.0 ug/l	
Heptachlor epoxide	8.0 ug/kg		1.0 ug/l	
Endosulfan I	8.0 ug/kg			
Dieldrin	16.0 ug/kg		1.0 ug/l	
O,P'-DDE			1.0 ug/l	
4,4'-DDE	16.0 ug/kg		1.0 ug/l	
Endrin	16.0 ug/kg		1.0 ug/l	
Endosulfan II	16.0 ug/kg			
O,P'-DDD			1.0 ug/l	
4,4'-DDD	16.0 ug/kg		1.0 ug/l	
Endrin Aldehyde	16.0 ug/kg			
Endosulfan sulfate	16.0 ug/kg			
O,P'-DDT			1.0 ug/l	
4,4'-DDT	16.0 ug/kg		1.0 ug/l	
Methoxychlor	8.0 ug/kg		1.0 ug/l	
Endrin ketone			1.0 ug/l	
alpha-Chlordane			1.0 ug/l	
gamma-Chlordane			1.0 ug/l	
Chlordane	80.0 ug/kg			
Toxaphene	80.0 ug/kg		1.0 ug/l	

TABLE 3-4 (CONT.)

ANALYTICAL PARAMETERS AND DETECTION LIMITS
FROM PREVIOUS INVESTIGATIONS

PARAMETER	SOIL	SURFACE WATER	GROUND WATER	TANK & DRUM
PESTICIDES/PCBS				
Phorate			0.05 ug/l	
Diazinon			0.05 ug/l	
Ronnei			0.05 ug/l	
Methyl Parathion			0.05 ug/l	
Terbofus (Counter)			0.05 ug/l	
Fonofos (Dyfonate)			0.05 ug/l	
Chloropyrifos (Dursban)			0.05 ug/l	
Malathion			0.05 ug/l	
Ethion			0.05 ug/l	
Trifluralin (Treflan)			0.01 ug/l	
Atrazine (Aatrex)			0.05 ug/l	
Alachlor (Lasso)			0.02 ug/l	
Metolachlor (Dual)			0.1 ug/l	
Cyanazine (Bladex)			0.05 ug/l	
2,4-D			0.1 ug/l	
Silvex			0.05 ug/l	
Arocior-1016	160.0 ug/kg			5 mg/kg
Arocior-1221	80.0 ug/kg			5 mg/kg
Arocior-1232	80.0 ug/kg			
Arocior-1242	80.0 ug/kg			5 mg/kg
Arocior-1248	80.0 ug/kg			5 mg/kg
Arocior-1254	160.0 ug/kg			5 mg/kg
Arocior-1260	160.0 ug/kg			5 mg/kg
PCBs, Total	5 mg/kg	0.1 ug/l	0.1 ug/l	5 mg/kg

TABLE 3-4 (CONT.)

ANALYTICAL PARAMETERS AND DETECTION LIMITS
FROM PREVIOUS INVESTIGATIONS

PARAMETER	SOIL	SURFACE WATER	GROUND WATER	TANK & DRUM
METALS				
Aluminum, Total			0.030 mg/l	
Antimony, Total	0.64 ug/g		0.040 mg/l	0.58 mg/kg
Arsenic, EP Tox.	20 ug/l			
Arsenic, Total	2.09 mg/kg	unk. ug/l	0.004 mg/l	0.35 mg/kg
Barium, EP Tox.	200 ug/l			
Barium, Total	200 mg/kg	100 ug/l	0.050 mg/l	200 mg/kg
Beryllium, Total	0.091 mg/kg		0.001 mg/l	2 mg/kg
Cadmium, EP Tox	0.1 mg/l			
Cadmium, Total	0.054 mg/kg	10 ug/l	0.003 mg/l	20 mg/kg
Cadmium, Dissolved			10.0 ug/l	
Chromium, EP Tox	20 ug/l			
Chromium, Total	8.0 ug/g	unk. ug/l	0.010 mg/l	20 mg/kg
Chromium, Dissolved			50.0 ug/l	
Cobalt, Total	10000 ug/kg		0.20 mg/l	
Copper, Total	5000 ug/kg	10 ug/l	0.010 mg/l	10 mg/kg
Iron, EP Tox	0.5 mg/l			
Iron, Total		unk. ug/l	unk mg/l	
Lead, EP Tox	0.5 mg/l			
Lead, Total	unk. mg/kg	50 ug/l	0.025 mg/l	4 mg/kg
Lead, Dissolved			50.0 ug/l	
Manganese, EP Tox	unk. mg/l			
Manganese, Total		unk. ug/l	unk mg/l	
Mercury, EP Tox	1 ug/l			
Mercury, Total	0.01 ug/g	unk. ug/l	0.0005 mg/l	1 mg/kg
Nickel, EP Tox	0.5 mg/l			
Nickel, Total	0.36 mg/kg	unk. ug/l	0.020 mg/l	1.9 mg/kg
Selenium, EP Tox	20 ug/l			
Selenium, Total	0.25 mg/kg	unk. ug/l	0.001 mg/l	0.680 mg/kg
Silver, EP Tox	20 ug/l			
Silver, Total	0.18 mg/kg		0.010 mg/l	20 mg/kg
Sodium, Total			unk mg/l	
Thallium, Total	0.17 mg/kg		0.008 mg/l	4.74 mg/kg
Vanadium, Total			0.010 mg/l	
Zinc, EP Tox	0.5 mg/l			
Zinc, Total	unk. mg/kg	unk. ug/l	0.010 mg/l	20 mg/kg

TABLE 3-4 (CONT.)

ANALYTICAL PARAMETERS AND DETECTION LIMITS
FROM PREVIOUS INVESTIGATIONS

PARAMETER	SOIL	SURFACE WATER	GROUND WATER	TANK & DRUM
OTHER PARAMETERS				
Acidity as CaCO3	0.10 %			
Aliphatic Acids			unk ug/l	
Aliphatic Hydrocarbons			unk ug/l	
Alkalinity	0.1 %		unk mg/l	
Ammonia Nitrogen			unk mg/l	
Ash at 550 C	unk. %			
Bomb Calorimetry	500 BTU/lb			
Boron			unk ug/l	
Bromide	0.01 %			0.01%
C3-Substituted Benzenes			unk ug/l	
C4-Substituted Benzenes			unk ug/l	
C5-Substituted Benzenes			unk ug/l	
Chloride,Total			unk mg/l	
Chlorine, Total	0.1 %			0.1%
COD			unk mg/l	
Cyanide (Total)	250 ug/kg		0.005 mg/l	5 mg/kg
Cyanide (Reactive)	5 mg/kg			5 mg/kg
Dimethylethoxyethanol			unk ug/l	
Flash Point	unk. F			
Fluoride	0.01 %		unk mg/l	0.01%
Hydrocarbons, Total	1.0 mg/kg			75 mg/kg
Indene			unk ug/l	
Methyl Benzene Methanol		500 ug/l	unk ug/l	
Methyl Indene			unk ug/l	
Nitrite & Nitrate			0.1 mg/l	
Oil and Grease			unk mg/l	unk mg/l
Phenols, Total	0.10 ug/g		unk ug/l	
Specific Gravity	unk.			
Sulfate, Total	200 mg/kg		unk mg/l	
Sulfides, Total	5 mg/kg			5 mg/kg
Sulfides, Reactive	0.5 ug/g			5 mg/kg
Sulfur	0.2 %			unk %
Total Organic Carbon	unk %		unk mg/l	
Total Solids	unk. %			
TOX Halogen	unk. ug/g		unk ug/l	
Water	unk. %			

TABLE 3-4 (CONT.)

ANALYTICAL PARAMETERS AND DETECTION LIMITS
FROM PREVIOUS INVESTIGATIONS

NOTES:

(1) Tentatively Identified Compounds (TICs) were examined in the volatile analyses of soil, ground water and tank & drum matrices.

(2) TICs were examined in the semivolatile fraction of the ground water, surface water and soil matrices.

(3) When detection limit varied with analysis for a given parameter in a given sample matrix, the lowest detection limit is reported.

The highest concentration of contamination is centered around the G-105 monitoring well cluster, which is located between the former tank farm and drum storage area (Figure 2-1). Lesser amounts of contamination were detected to the south and southeast, in well clusters G-102, G-104, and G-106. Several contaminants, all of which were qualified by the laboratory, were detected in well cluster G-101, which is probably upgradient of the site. All but one of these contaminants were detected in the laboratory method blank; thus, the upgradient samples are considered free of site-related contamination.

The distribution of contaminants in ground water suggests the presence of a southeastward migrating plume containing a variety of volatile organics, semi-volatile organics, and PCBs. The wells furthest from the site that have documented ground water contamination are G-102G, G-102D and the Williams Bait Shop Residential Well (IEPA, 1988). Low concentrations of several volatile organic compounds and one semi-volatile organic compound have been detected in all of these wells. Based on the IEPA ground water data from July 29, 1986 and June 30, 1987, the plume is present at 30.8 feet below the ground surface and may extend 60 feet off site.

Surface water and sediment in the drainage ditch adjacent to the Lenz Oil site are also potential pathways of contaminant migration from the site. The drainage ditch flows into the Des Plaines river southwest of the site. The potential impact of contamination from the Lenz Oil site on the water and sediment in the drainage ditch has not been previously evaluated, to our knowledge.

3.3 Potential Receptors

Ground water users are the primary receptors of concern, and ecosystems are considered a secondary receptor of contamination from the Lenz Oil site. According to the HRS package for the Lenz Oil site (U.S. EPA, 1987), 11,335 people live within three miles of the site and use the aquifer of concern for drinking water purposes. Although municipal water has been furnished to all residences in the immediate vicinity of the site as part of the IEPA remediation efforts, the number of ground water users within a three-mile radius of the site will be reassessed, and the risk posed by the site to this population will be evaluated as part of this RI/FS.

Surface water in the vicinity of the site is limited to an intermittent drainage ditch located along the northwest border of the site. Surface water in the ditch flows to the Des Plaines River, southwest of the site. There are no surface water intakes on the Des Plaines River within three miles downstream of the site (USEPA, 1987); therefore, there is no receptor population associated with the surface water migration pathway. However, ecosystems along the drainage ditch and Des Plaines River may be impacted by potential surface water/sediment contamination.

3.4 Environmental and Public Health Effects

The potential for environmental and public health effects resulting from surface water and/or ground water contamination at the Lenz Oil site is unknown. The HRS package for the site indicates that contaminants having a high toxicity and persistence have been documented in the aquifer of concern, which is utilized by a sizable population for drinking water purposes (U.S. EPA, 1987).

However, this assessment is not representative of current conditions at the site. Remediation efforts by the IEPA have eliminated the primary source of ground water contamination and supplied ground water users immediately downgradient of the site with a permanent alternative drinking water supply. However, a future land use scenario may allow the local ground water to be used as a source of drinking water. Given the many changes in site conditions and the target population, the magnitude of the potential threat to area water supply wells is considered unknown. As part of the RI, a baseline endangerment assessment will be conducted to define the potential for environmental and public health effects resulting from contamination to the Lenz Oil site. Potential receptors will be evaluated with respect to the current and potential future land use scenarios.

To date, no data are available that confirm surface water and/or sediment contamination. Thus, potential environmental effects resulting from contamination of the drainage ditch cannot be evaluated at this time; however, sampling proposed for the RI does address this issue.

3.5 Preliminary Identification of Operable Units

All immediate problems that required early interim action were identified during the IEPA site investigation and addressed by previous expedited response actions. Because of the small size of the site and the single migration pathway to be evaluated during the investigation, the site will be considered as a single unit rather than several operable units. However, if data collected during the RI indicate that an operable unit approach would be more effective, phased responses may be undertaken.

4.0 WORK PLAN RATIONALE

Section 4.0 identifies potential remedial approaches that are consistent with the available site information in a very preliminary way. Section 4.0 also presents the criteria that will be utilized to screen and evaluate the remedial alternatives.

4.1 Identification of Remedial Alternatives

Information compiled during the preparation of the Initial Site Evaluation indicates that the on-site soil, off-site surface water, sediment, and ground water have the potential to be contaminated by past storage and disposal activities at the Lenz Oil site. Due to uncertainties concerning ground water flow and the effectiveness of previous on-site remedial activities, additional remedial alternatives may be developed during the RI phase. Based on the preliminary site characterization data collected to date, possible remedial alternatives may include, but are not limited to, the following:

Remedial Alternative 1 - No Action

According to federal regulations (CERCLA), this remedial action must always be evaluated as a point of comparison.

Remedial Alternative 2 - Access Restrictions

This remedial action would include fencing and deed restrictions such as the prohibition of excavation and the installation of drinking water wells. Access restrictions would eliminate risks

associated with exposure to residual contamination in site soils, but they would not reduce the concentration of residual soil contamination or the potential migration of such contamination.

Remedial Alternative 3 - Sediment/Soil Removal and Treatment On-Site

The removal and treatment of the contaminated sediment would eliminate the source of surface water contamination, but this procedure would not eliminate ground water contamination or its potential migration. Treatment processes available include incineration, solidification and chemical treatment. Residual on-site and off-site soil contamination could also be addressed with this alternative, which would further diminish the source of ground water and surface water contamination.

Remedial Alternative 4 - Sediment/Soil Removal and Treatment/ Disposal Off-Site

Treatment/disposal off-site is generally discouraged under CERCLA. Off-site treatment and disposal options available include incineration, solidification, and disposal in a secure landfill. This alternative would eliminate the source of surface water contamination but not current ground water contamination, if any. This alterative could also be used to address sediment contamination and residual soil contamination.

Remedial Alternative 5 - Sediment/Soil Removal and Land Disposal On-Site

This response action would include the excavation and disposal of contaminated soil in a RCRA-approved hazardous waste disposal cell constructed on-site. This option would require long-term monitoring, would remove and isolate the source of contamination, and would reduce migration of contaminants off-site. This alternative would not eliminate current ground water contamination, if any, or the migration of ground water.

Remedial Alternative 6 - In-Situ Sediment/Soil Treatment

Biodegradation, aeration, or chemical oxidation could be used to remove some of the residual contaminants found in the on-site soil and/or contaminants in off-site soil and/or sediment. Most likely, flushing of the soil coupled with ground water withdrawal and treatment would be required to remove all contaminants. This option would remove the source of the contamination but would not correct current ground water contamination, if any.

Remedial Alternative 7 - Ground Water Withdrawal and Treatment

Contaminated ground water (if any) directly related to the site could be withdrawn and treated by chemical precipitation, aeration, activated carbon adsorption, or biodegration. Ground water withdrawal could be accomplished through the use of extraction wells or subsurface drains. Treated ground water could be discharged to the closest surface water or recharged to the aquifer system. Consideration would be given to using the local municipal

wastewater treatment facilities. This alternative would eliminate the migration of contaminants off-site via ground water.

Remedial Alternative 8 - Isolation of Contaminated Soil and/or Ground Water

This alternative would prevent the off-site migration of contaminants, control the influx of clean ground water, or ground water contaminated from off-site sources during any ground water withdrawal and treatment program. Appropriate technologies would include: synthetic or clay cap systems, slurry walls, grout curtains, or sheet pilings. This alternative would not address the contaminants that have already migrated off site.

Multiple Remedies

A combination of two or more of the remedial alternatives may be implemented as the final remedial action.

4.2 Performance Criteria and Standards for Remedial Alternatives

Performance criteria will be based on Applicable or Relevant and Appropriate Requirements (ARARs), and potential risks to human health and the environment. All response actions will be developed that attain remediation levels within the range of 10^{-4} to 10^{-7} maximum lifetime risk, and at least one alternative will restore ground water to a 10^{-6} maximum lifetime risk level within five (5) years. All remedial alternatives will be compared to ARARs set by regulatory authorities. Any selected alternatives

will meet the ARARs in accordance with SARA and the National Contingency Plan (NCP).

4.3 Remedial Alternative Evaluation Criteria

The U.S. EPA "Guidance on Conducting Remedial Investigations and Feasibility Studies under CERCLA," Interim Final, October 1988 provides the consistent basis for comparing and evaluating the preliminary remedial alternatives. The evaluation criteria are:

- Overall protection of human health and the environment;
- Compliance with ARARs and justification for any required ARAR waivers;
- Reduction of toxicity, mobility, or volume of hazardous substances at the site;
- Long-term effectiveness and permanence of alternatives in maintaining protection of human health and the environment;
- Short-term effectiveness of alternatives in protecting human health and the environment during construction and implementation of the remedy;

- Implementability (the technical and administrative feasibility of alternatives and the availability of required goods and services); and

- Cost of implementation, operation and maintenance of the alternatives.

4.4 Identification of Current Data Gaps

Review of available data has provided the following information concerning the Lenz Oil site:

1. General information concerning geology and hydrogeology of the area from published studies and reports. Site-specific information concerning soils, bedrock, and hydrogeology is available from on-site monitoring wells, but no information has been obtained from off-site well logs. These well logs are available from the Illinois Geological Survey and Water Survey and will provide information on the general hydrologic system in the area of the site.

2. Complete documentation of the types and quantities of wastes last stored at the Lenz Oil site. There is no certainty that this listing of waste material is representative of the entire history of the Lenz Oil site.

3. Documentation of the locations of known waste storage areas and on-site soil contamination, both surface and subsurface.

4. Limited information available concerning the vertical and horizontal migration of contaminated ground water on the Lenz Oil site.

5. Limited data concerning contaminant migration outside of the Lenz Oil site.

6. General information concerning property ownership.

The information needed to fill the current gaps in the data is as follows:

1. On-site geologic data including:

   a. Stratigraphy at the site.

   b. Characterization of geotechnical, hydrological, and geological parameters of the sediments and bedrock in the site vicinity.

   c. Confirmation of the given geological data including well logs and

hydrogeologic data such as hydraulic conductivities and transmissivities.

d. Better definition of the water table configuration and ground water flow directions.

2. Evaluation of the types and quantities of wastes stored at the site, as well as the contamination detected in the on-site soils before remediation to characterize the former source of ground water contamination.

3. More detailed characterization of the on-site soil as it exists now on the Lenz Oil site. Because most of the contaminated soil was incinerated and redeposited at the site, a more detailed characterization of the current soil conditions is needed.

4. Additional information is required to determine the extent and severity of surface water and/or sediment contamination attributable to the site, if any.

5. More detailed evaluation of the extent of potential migration of contaminants in ground water from the site.

6. More detailed information concerning the potential impact to receptors. Specifically, a survey of public water supplies should be conducted to determine those residents that use ground water and which aquifer they use. Appropriate residential wells will be sampled and analyzed for Target Compound List (TCL) or Target Analytical List (TAL) parameters attributable to the Lenz Oil site.

7. Information regarding the identity and location of any threatened and/or endangered species at or near the Lenz Oil site is needed.

4.5 Remedial Investigation/Feasibility Study Objectives

The ultimate objectives of this RI/FS are as follows:

- Quantify the type and extent of contamination on site and off site.
  - Identify the relationship between current contamination and the IEPA eliminated origin/source.
  - Establish the potential for future contamination migration.

- Identify/develop standards and criteria for contaminant cleanup.

- Determine the magnitude and probability of the actual or potential harm to public health, welfare, or the environment.

o Complete Remedial Action Assessments.

- Identify technological options for cleaning up and preventing further migration of contaminants.

- Evaluate remediation alternatives consistent with the National Contingency Plan and other regulatory requirements and guidelines.

4.6 Identification of Data Quality Objectives

Data quality objectives (DQOs) are qualitative and quantitative statements which specify the quality of the data required to support decisions during remedial response activities. DQOs are established prior to data collection to ensure that the data collected are sufficient and of adequate quality for their intended end uses. Data quality objectives were developed for the Lenz Oil RI/FS in accordance with the USEPA guidance document "Data Quality Objectives for Remedial Response Activities," dated March, 1987.

Data collected during the Lenz Oil RI/FS must be of sufficient quality and quantity to provide an acceptable level of confidence in decision making and must address the following project objectives:

- Determine the presence/absence and types of contaminants remaining in the on-site soil and the presence/absence and types of contaminants along the potential migration pathways including ground water, and surface water/sediment.

- Determine the mechanism of contaminant release to the various pathways.

- Determine the direction of transport pathways(s).

- Determine the horizontal/vertical boundaries of source(s) and pathways of contamination, and

- Determine routes of exposure and potential environmental and public health threats.

The primary uses for data collected during the Lenz Oil RI/FS will be for site characterization, risk assessment, and evaluation of remedial alternatives; however, health and safety and engineering design of alternative uses are also anticipated. The priority of data uses, beyond those health and safety data used to establish

the level of protection, are for site characterization, risk assessment and the evaluation of remedial alternatives. These data uses will require the highest level of confidence. Therefore, sampling and analytical procedures with low limits of uncertainty will be required.

Based on these intended data uses, the types of samples to be collected and the physical and chemical characteristics to be analyzed have been selected. The following types of samples will be collected: surface and subsurface soil, soil gas, sediment, surface water, ground water and QA/QC samples. Each of these sample types will be analyzed for one or more of the following: TCL volatile organic compounds, TCL semivolatile organic compounds, TCL PCBs/pesticides, TAL metals, TAL cyanide, and toxicity characteristic leachate procedure (TCLP) parameters. Physical characteristics to be measured include various soil properties, aquifer properties, and water parameters.

The following levels of analysis are anticipated for the Lenz Oil RI/FS (based on "Data Quality Objectives for Remedial Response Activities" - EPA/540/6-87/003):

- Level I - Real-time field screening or analysis using portable instruments. These instruments may include the use of trace gas detectors, HNu photoionization detectors, pH meters, and specific conductance meters.

- Level IV - Contract Laboratory Program (CLP) routine analytical services (RAS). These

analyses will be performed at an off-site CLP analytical laboratory following rigorous QA/QC protocols and documentation. These analyses will include TCL volatile and semivolatile organic compounds, pesticides/PCBs, TAL metals, and cyanide.

- Level V - Analyses using non-standard methods which will be performed at an off-site laboratory. These types of analyses will include analyzable VOC compounds in soil gas and TCL volatile and semivolatile organic compounds, and pesticides/PCBs and TAL metals and cyanide for drinking water wells.

The determination of data quantity needs, the sampling and analysis approaches and the precision, accuracy, representativeness, completeness, and comparability (PARCC) parameters are discussed in the SAP which accompanies this Work Plan. These elements were formulated to allow a high level of confidence in subsequent remedial respond decision making. The data collection program of the Lenz Oil RI/FS is summarized in the SAP, where specific information regarding sampling and analytical protocols and procedures is presented.

4.7 Work Plan Approach

The Work Plan provides the general description of the activities to be performed as part of the RI/FS. Because the RI/FS process is dynamic and iterative, this Work Plan has been prepared using a

phased, iterative approach that recognizes the interdependence of the RI and FS. In this way, the Work Plan can be modified during the RI/FS process to incorporate new information and to refine project objectives. The primary intent of the phased approach is to minimize the need for conducting supplemental RI and FS activities by thorough characterization of the migration pathways and early identification of the site-specific data requirements associated with the applicable remedial technology.

The conceptual site model for the Lenz Oil site is poorly defined, primarily because of lacking and/or insufficient existing site data. Therefore, a limited field investigation will be undertaken during Task 1 of the RI to better develop the conceptual site model. The results of these reconnaissance activities conducted under Task 1 will be reviewed with USEPA and IEPA personnel, along with the results of concurrent site background investigations, to modify as necessary, subsequent tasks necessary to characterize the site and its potential hazard to public health and the environment. The necessity and nature of further characterization outside of the initial investigative area will also be discussed with regulatory personnel at this time. Once these data have been reviewed and the conceptual site model has been refined, data needs can be better defined to substantiate or refine the stated data quality objectives.

5.0 REMEDIAL INVESTIGATION TASKS

This section describes the site investigation activities that will be conducted during Phase I of the RI/FS for the Lenz Oil site. Additional investigative work, which may include the installation of new monitoring wells, surface water sampling, or sediment sampling, will be conducted in Phase II of the RI/FS, if necessary, to adequately define the extent and severity of contamination from the Lenz Oil Site. The scope of Phase II activities will be based on the results of Phase I tasks.

Various project plans that detail specific issues concerning the execution of the project have been prepared as supporting documents to the Work Plan. These documents which contain specifications for sampling and analysis, quality assurance, health and safety, and data management are briefly described below.

- Field Sampling Plan - Covers data collection objectives, sample locations, sample numbering, sampling equipment and procedures, sample analysis and handling, field measurements, sample documentation and tracking, sampling personnel, and schedule of field activities.

- Quality Assurance Project Plan (QAPP) - Covers Quality Assurance (QA), data measurement objectives, sampling objectives and procedures, sample custody, calibration procedures, internal quality control (QC) checks, QA performance audits, QA reports, preventative maintenance, data assessment

procedures, corrective action, and field QC procedures.

- Health and Safety Plan - Covers personnel protective equipment required for various activities during the field investigation, contingency plans and emergency procedures, field monitoring equipment, and decontamination procedures. The Health and Safety Plan also addresses site management including site access and security, decontamination facilities, support facilities, and regulated areas.

- Data Management Plan - Covers the procedures and format of documentation required for the RI including: documentation of field measurement, chain-of-custody documentation, QA/QC documentation, data validation, data storage and security, progress report, and technical memoranda.

5.1 RI Phase I, Task 1 - Description of Current Situation and Investigative Support

Phase I, Task 1 activities include summarizing the site background and the current environmental conditions at the site, indicating the physical boundaries of the study area, identifying potential receptors, developing a site map, delineating a site grid system to allow for accurate location of sample points, and conducting a soil gas survey to guide placement of down-gradient monitoring wells.

5.1.1 Site Background

Data pertaining to the history of ownership, land use, regional and site-specific geology, and hydrogeology, physiography, and a description of area boundary features will be collected and summarized. Available published information regarding the identity and location of any threatened and/or endangered species at or near the Lenz Oil Site will also be reviewed.

5.1.2 Nature and Extent of Contamination Problem

A detailed review of analytical data from waste samples previously collected by the IEPA will be conducted to define the following properties of wastes last stored at the Lenz Oil site: type, physical state, concentration, quantities, locations, and containment. The nature and extent of on-site releases to the soil will be evaluated to determine the potential impact on the ground water system. Analytical data for soil samples collected by the IEPA will be the primary source of data for this evaluation. The results of several rounds of monitoring and residential well sampling will be further evaluated to guide placement of future monitoring wells.

Available information concerning the potential toxicity of contaminants and the degree of ground water contamination will be assessed. This analysis will include actual or potential human and/or environmental exposures from ground water. Environmental impacts and health effects, if any, will be evaluated on-site and off-site.

5.1.3 History of Response Actions

A summary of all response actions and previous site investigations conducted by any regulatory agencies or private parties will be completed. This summary will include a review of valid technical reports and any other valid documentation of sampling results prepared subsequent to each response action or site investigation. Chronological documentation indicating the date, principal investigator, and results of all response actions and site investigations will be prepared.

Background information collected during this subtask will be used to refine the scope of work for the detailed site investigation conducted in RI Phase I, Task 2.

5.1.4 Site Boundary Survey and Base Map

A site boundary survey will be conducted to define the study boundaries and delineate the Lenz Oil site property lines. Existing land use information available from public records will be used to determine the owners of adjacent properties who would have to be contacted if off-site investigative activities are required. This task may have been performed by the IEPA during previous investigations in which case the IEPA data will be used.

5.1.5 Site Grid and Topographic Survey

A grid system will be established on the Lenz Oil site to ensure the accurate location of sampling points. The grid system will consist of two perpendicular baselines with 100-foot grid intervals that will be used to establish transect lines for sampling

locations. All monitoring wells and soil gas sampling locations will be based on the site grid.

Ground elevation data will be collected with an accuracy of ± 0.01 feet to develop one (1)-foot elevation contours across the entire site. The elevation data will be used as the ground control during site investigation activities for constructing geologic cross-sections and estimating contaminated soil quantities.

5.1.6 Historical Aerial Photograph Analysis

All available historical aerial photographs, from the beginning of site operations to the present, will be obtained for review. These photographs will be used to determine the growth and expansion sequence of the Lenz Oil operations and to identify any past waste disposal or storage areas. The previous location of any storage areas will be of special interest.

5.1.7 Area Ground Water Usage Survey

A survey of residential, municipal, and industrial wells in the vicinity of the Lenz Oil site will be conducted. Municipal and state records will be researched to obtain drilling logs and well installation records for existing wells within three (3) miles of the site. The objectives of this survey are to complete the following tasks:

- Identify usable aquifers in the area.
- Identify the number, type, and location of wells in the vicinity of the site. Information concerning well constructions

(depth, casing and screen materials, screened interval, etc.) will be obtained.

- Determine if wells pump from the same aquifer potentially contaminated by the Lenz Oil facility.

- Determine which wells are suitable candidates for sampling during RI Phase I, Task 2.

5.1.8 Evaluation of Ground Water Flow Direction

Although most of the available ground water elevation data for the site indicates flow is toward the southeast, one round of measurements taken during IEPA excavation and incineration activities shows a northwest component of flow. Therefore, ground water elevation measurements will be collected from existing monitoring wells at one-month intervals to document any seasonal variation in the ground water flow direction. The final location of monitoring wells will be established based on these and other data generated during Task 1.

5.1.9 Regional Fracture Analysis

A regional fracture analysis will be conducted to gather information regarding the orientation, spacing, width, lateral extent, and interconnectedness of bedrock fractures in the vicinity of the Lenz Oil Site. Because much of the surficial aquifer is composed of fractured limestone and dolomite, fractures are undoubtedly a dominant factor controlling ground water flow direction and velocity. Specifically, the regional fracture network will be defined as completely as is practical by compiling

data from aerial photographs, topographic maps, geologic maps, and previous investigations, such as those conducted by the U.S. Geological Survey at a nearby low-level radioactive-waste disposal site. The published data will be supplemented with direct measurement of fracture orientation, width, spacing, and lateral extent in quarries and outcrops of the Silurian bedrock in the vicinity of the site, if additional data are needed. The fracture data will be compiled, mapped, and statistically analyzed for structural and stratigraphic trends that may control local ground water flow patterns.

5.1.10 Technical Memorandum 1

Results of the background study performed as part of Phase I, Task 1 will be compiled and interpreted for presentation in Technical Memorandum 1, the Description of Current Situation Report. This memorandum will be submitted to U.S. EPA and IEPA for their review, prior to the initiation of monitoring well installation. Based on this review, appropriate modifications, consistent with the objectives of the Lenz Oil RI/FS, may be made to the Work Plan pursuant to the terms of the Administrative Order.

5.1.11 Subcontracting and Mobilization

Prior to initiating the Remedial Investigation field work, it will be necessary to procure subcontractor services, establish field support facilities, and identify, obtain and mobilize equipment and materials. Specific work items associated with each of the aforementioned categories are listed below.

5.1.11.1 Procure Subcontractor Services

Subcontractors must be secured for the following field activities:

1. Construction - a construction subcontractor to construct Items 1, 3, and 4, listed under Field Support Facilities.

2. Surveying - an Illinois licensed surveying subcontractor to conduct the site boundary, site grid, and elevation surveys.

3. Drilling - a drilling subcontractor to install monitoring wells, soil sampling borings, and piezometers. The subcontractor must register or be registered with the IEPA.

5.1.11.2 Provide Field Support Facilities

1. Complete minor grading and leveling of a small portion of the site as required to locate field support facilities such as a decontamination pad.

2. Rent and set up a project office trailer on site for supervision of site investigations and staging health and safety equipment. USEPA and IEPA personnel will have access to this area.

3. Construct a secure (fenced) storage area.

4. Construct a lined decontamination pad for washing down drill rigs and other heavy equipment. The pad will consist of a heavy synthetic liner, a sump to collect runoff from the pad, and wooden planks to support the drill rig without damaging the liner. The pad will be equipped with a transfer pump for collecting the decontamination water in steel drums. Upon completion of field activities, the decontamination pad will be disassembled and stored in 55-gallon drums.

5. Set up a sampling equipment decontamination area.

6. Set up a personnel decontamination area.

7. Arrange telephone and electrical hook-up at the site project trailer.

8. Arrange for on-site water and sewage facilities.

5.1.11.3 Mobilize Equipment and Materials

In order to mobilize equipment and materials, ERM will complete the following activities:

1. Schedule and obtain non-expendable health and safety and sampling equipment.

measurement of the total volatile organic concentration in the soil gas. If a zone of elevated concentration is detected by the HNu meter, additional soil gas sampling points may be added to further investigate the contaminated zone.

The soil gas investigation will be conducted in the open areas south of the Lenz Oil site unless ground water elevation data indicates possible plume migration in another area. Sampling points will be located at 50-foot intervals along southwest-northeast trending traverses spaced 100-feet apart (Figure 5-1). These locations will coincide with the grid system established earlier in the RI. An estimated 40 investigative soil gas samples are planned for this task; however, additional samples will be collected if necessary.

Results of the soil gas survey will be plotted, and the iso-concentrations lines for each indicator compound will be constructed to evaluate the areal distribution of volatile organic compounds below the site. In this way, the ground water contaminant plume can be mapped, in preparation for installation of monitoring wells.

5.1.13 Technical Memorandum 2

Results of the soil gas investigation conducted under Phase I, Task 1 will be compiled and interpreted for presentation in a Technical Memorandum 2. This memorandum will be submitted to U.S. EPA and the IEPA for their review prior to the initiation of monitoring well installation. Based on this review, appropriate modifications consistent with the objectives of the Lenz Oil RI/FS may be made to the Work Plan pursuant to the terms of the Administrative Order.

2. Schedule and obtain expendable health and safety equipment (gloves, booties, tyvek overalls, etc.), and other supplies.

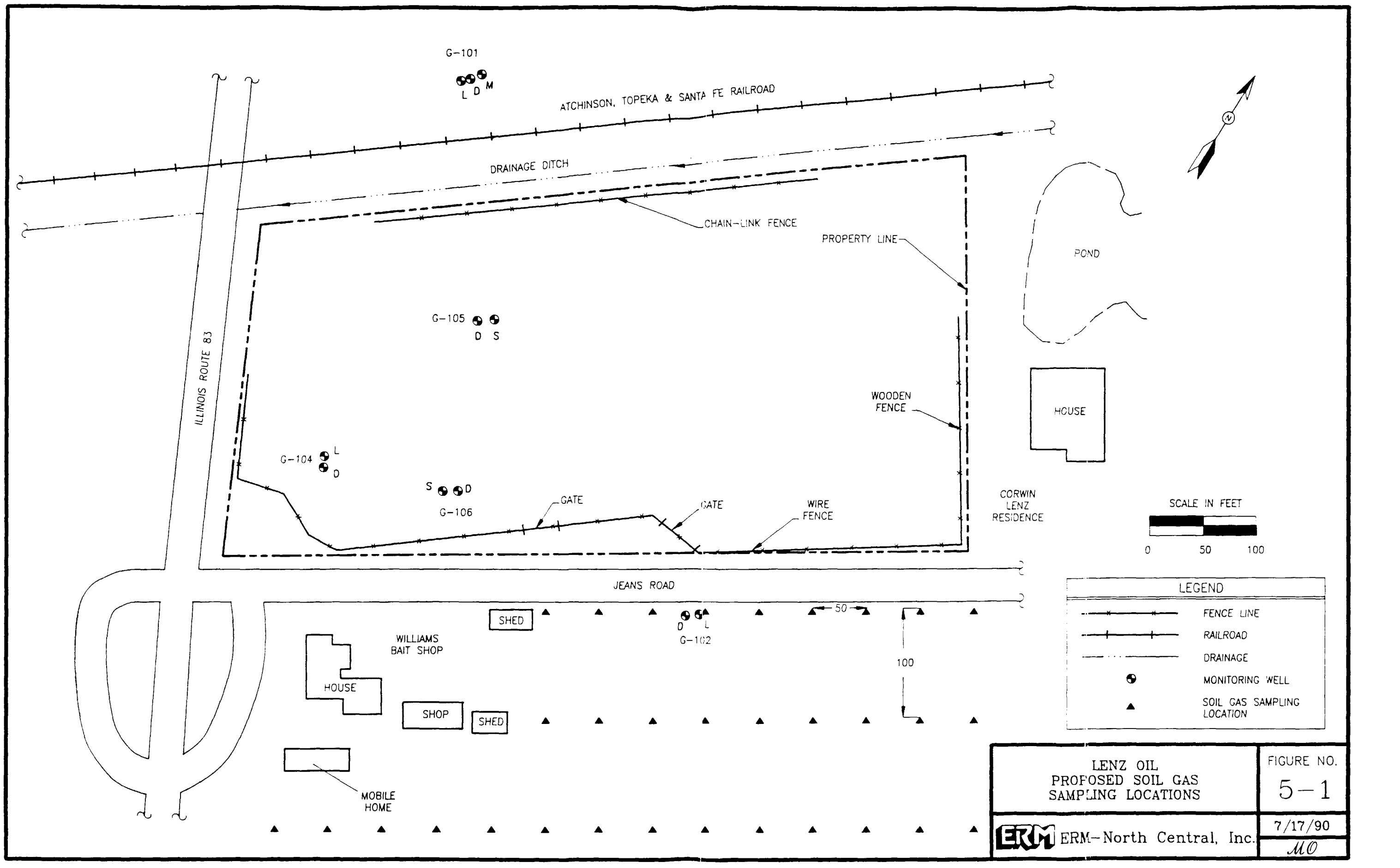
3. Schedule and obtain all necessary sampling bottles, preservatives, coolers, etc.

4. Obtain all miscellaneous items needed on-site (paper, pens, telephone books, etc.)

5.1.12 Soil Gas Investigation

A soil gas survey will be conducted to evaluate the areal distribution of volatile organic contamination downgradient of the Lenz Oil site. Soil gas sampling permits the measurement of organic vapors that volatilize from contamination in the ground water, and are present in the soil pores of the unsaturated zone. The procedure involves pumping soil vapor from the unsaturated zone onto carbon tubes and analyzing the tubes for volatile organic compounds. The soil gas samples will be transmitted daily by overnight carrier to Pace Laboratories, Minneapolis, Minnesota. Pace is a CLP organics lab with extensive experience analyzing activated carbon samples from soil gas surveys. The following six compounds, which were found in significant concentrations during previous site investigations, will be analyzed as indicator compounds in the soil gas survey: 1,2-dichloroethane, 1,2-dichloroethene (total), trichloroethene, 1,1,1-trichloroethane, toluene, and xylene. Analyses will be run on an expedited (less than 14 days) turnaround.

Subsequent to collecting a soil gas sample in the activated carbon tubes, an HNu photoionization meter will be used to obtain a field



LENZ OIL
PROPOSED SOIL GAS
SAMPLING LOCATIONS

FIGURE NO.
5-1

ERM ERM-North Central, Inc.

7/17/90

MO

5.2 RI Phase I, Task 2 - Site Investigation

Detailed investigations conducted during RI Phase I, Task 2 will be designed to characterize the site and its actual potential hazard to the public health and the environment. These studies will provide the additional data needed for the development and evaluation of remedial alternatives during the Feasibility Study. The goals of Task 2 include the following:

- Evaluate the nature and extent of residual contamination present on the Lenz Oil site.
- Evaluate the nature and extent of surface water and sediment contamination attributable to the Lenz Oil site.
- Evaluate the vertical and horizontal extent of ground water contamination potentially originating from the Lenz Oil site.
- Evaluate the nature and magnitude of ground water, surface water, and sediment contamination that has migrated on-site and is not attributable to the Lenz Oil site.
- Identify and evaluate potential contaminant migration characteristics.
- Collect sufficient data to support an Endangerment Assessment, a Feasibility Study and an ATSDR Public Health Assessment of the Lenz Oil site.

The primary subtasks of the detailed site investigation are a source characterization study and a site characterization study. These subtasks will identify any contamination on-site and off-site and fully evaluate the primary contaminant migration routes (ground water, surface water, and sediment).

Air monitoring will be conducted as part of the Health and Safety Plan to protect workers on-site. These data will be evaluated during the RI to determine whether or not an air monitoring program for the protection of public health or the environment off-site is necessary. Air dispersion modeling will be included in the Feasibility Study to support evaluation of remedial alternatives, which may result in significant emission rates, such as air stripping or excavation.

5.2.1 Source Characterization

5.2.1.1 Overview

The source characterization sampling program is designed to provide site-specific data to confirm the effectiveness of previous treatment activities on-site. In 1988, the contents of the drums, tanks, and contaminated soil identified during a remedial investigation performed by the IEPA were incinerated using a transportable rotary kiln incinerator. In addition to the liquid waste and the soil removed down to bedrock in the main excavation area (Figure 2-3), soil from hot spots in the former surface impoundment area was incinerated. The on-site drums were also shredded and incinerated. Approximately 21,000 tons of soil were excavated from the site and incinerated. The quantity of soil removed from the main excavation area and the quantities removed from hot spots outside the main excavation area are unknown.

Excavation of contaminated soil for incineration was carried out until bedrock was encountered in the vertical direction and until the native soil lateral to the excavation area was found to contain less than 5 ppm total volatile organic compounds. This was achieved in most places at a depth of 9 to 11 feet below ground surface, which corresponds with the top of bedrock. During remediation of soil in the main excavation area, IEPA had a 10 mil (.001 inch) layer of pond-liner grade visqueen (a special type of plastic liner) installed above the bedrock encountered at the base of the excavation pit. The visqueen was manually installed, and overlapping layers of visqueen were solvent welded. The liner covers the entire main excavation area, including the floor, sidewalls and approximately one foot of the level ground surrounding the excavated area.

Incinerator ash was then placed above the visqueen as backfill material. No information was found in the IEPA files that describes how the monitoring wells in cluster G-105 were protected during excavation of the surrounding soils, or how the liner was sealed around the wells to prevent ground water from migrating between the well casing and the liner. The purpose of this visqueen was to provide a barrier between the incinerated ash and the native soil and to prevent ground water, reportedly contaminated with volatile organics, from contacting the incinerated ash. The visqueen should provide adequate safeguard to prevent the contaminated ground water underlying the Lenz Oil site from contacting the ash (IEPA, 1990).

Soil was also excavated from hot spots in the vicinity of the former surface impoundment area. However, the volume of soil excavated from this area is unknown. The excavated area was not lined with visqueen, but was backfilled with clean material.

Information concerning soil excavation, liner installation and incineration activities were gathered from Janssen (1988), Janssen (1990), IEPA (1990) and Gardenour (1990).

5.2.1.2 Objectives

The objectives of the sampling program are as follows:

- Supplement existing information on the extent of soil contamination;
- Confirm that the vertical and lateral extent of soil incineration was sufficient for effective remediation of contaminated soil;
- Document the quality of incinerated ash used for backfill;
- Confirm that the quality of the ash used for backfill conformed to treatment standards; and
- Determine the nature and extent of contamination in soils that were adjacent to the incinerator and the existing fire hydrant (IEPA, 1990).

5.2.1.3 Soil Sampling

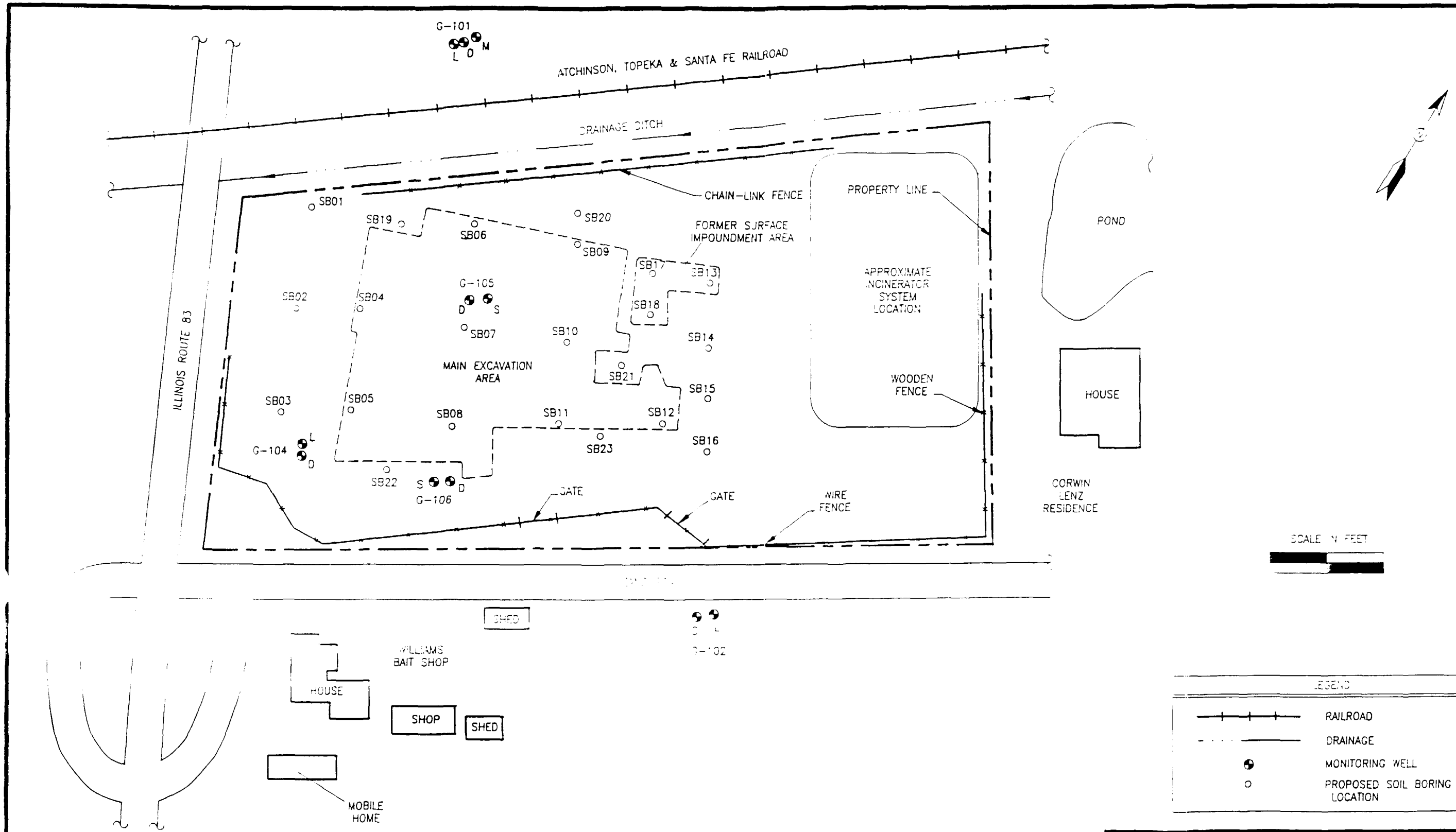
Soil sampling will be conducted within the main excavation area to confirm that the backfilled material satisfied established treatment standards. The sampling will be limited to shallow depths to avoid puncturing the visqueen liner and possibly allowing

contaminated ground water to migrate into the clean backfill. In most areas, the soil sampling will extend to a depth of 9 feet, but a selected number of soil borings will be limited to a depth of 5 feet.

Samples will be collected outside the main excavation area to: (1) determine if the horizontal extent of excavation was sufficient, (2) investigate the soil staining adjacent to the existing fire hydrant, and (3) verify that excavation in the former surface impoundment area was sufficient. An aerial photograph of the site shows dark soil staining adjacent to the existing fire hydrant. This area will be identified in the field and sampled. The rationale for sampling here is to determine if there are any VOCs associated with the soil staining. Soil borings outside the main excavation area will be drilled until bedrock is encountered.

Soil sampling will not be conducted beneath the visqueen liner because the sampling procedure would require puncturing the liner and potentially allowing contaminated ground water to infiltrate the clean backfill.

A total of 57 subsurface soil samples will be collected from the 23 soil boring locations shown on Figure 5-2. The soil boring locations will be numbered SB01 to SB23 (Figure 5-2). All borings will be advanced to total depth using 3-1/4 inch inside diameter (ID) hollow-stem augers. Continuous samples will be collected from all borings for soil characterization and for chemical analysis. A 5-foot-long, 3-inch outside diameter (OD) steel continuous sampler will be used to collect samples for screening and analysis. Upon completion of sampling, the soil borings will be backfilled using drill cuttings from the boring.



SOURCE: EBASCO SERVICES, 6/90

LENZ OIL ON-SITE SOIL SAMPLNG LOCATIONS	FIGURE NO. 5-2
ERM-North Central, Inc.	11/9/90 MO

A total of 57 investigative samples, 6 duplicates, and 6 rinsates will be collected for the analyses. All samples collected within the main excavation area will be analyzed for TAL total metals, cyanide and TCLP metals (Table 5-1). Selected samples from within the main excavation area will also be analyzed for TCL volatile organics, semivolatiles organics, PCBs, and pesticides (Table 5-1). All samples collected outside the main excavation area will be analyzed for TCL volatile organics, semivolatile organics, pesticides, and PCBs, and TAL metals and cyanide (Table 5-1).

Soil borings SB01, SB02, and SB03, located west of the main excavation area, will be spaced 100 feet apart and will extend to bedrock. These borings will initially be drilled to a depth of 5 feet. Soil obtained from the 0-2.5 foot and 2.5-5 foot intervals will be screened for VOCs with a PID. An analytical sample will be collected from the interval exhibiting the highest PID reading. If neither sample exhibits a PID reading above background, an analytical sample will be collected from the 2.5-5.0 foot interval. Soil will continue to be sampled in 5-foot intervals and screened in 2.5 foot intervals until bedrock is encountered. A second analytical sample will be collected from the 2.5-foot interval of soil between a depth of 5 feet and bedrock that exhibits the highest PID reading. If none of the soil between a depth of 5 feet and bedrock exhibits a PID reading above background, an analytical sample will be collected from the 2.5-foot interval immediately above bedrock. A total of 6 investigative analytical samples will be collected from these three locations and will be analyzed for TAL metals and cyanide, and TCL volatile organics, semivolatile organics, pesticides, and PCBs. The data acquired from these borings will supplement existing information on the horizontal and vertical extent of soil contamination in the western portion of the site and confirm whether the soil staining observed in the aerial

TABLE 5-1

SUMMARY OF SOURCE CHARACTERIZATION SAMPLING AND ANALYSIS PROGRAM

Sample Matrix	Field Parameter	Laboratory Parameter	Investigative Samples			QA Samples									Matrix Total
						Replicate			Field Blank			MS/MSD			
			No.	Freq.	Total	No.	Freq.	Total	No.	Freq.	Total	No.	Freq.	Total	
Soil Samples	Qualitative Organic Vapor Screening with HNu		41	1	41	5	1	5	5	1	5	0	0	0	51
		T.C.L. Volatile Organics	18	1	18	2	1	2	2	1	2	0	0	0	22
		PCBs/Pesticides	18	1	18	2	1	2	2	1	2	0	0	0	22
		T.A.L. Metals	41	1	41	5	1	5	5	1	5	0	0	0	51
		TCLP Metals	23	1	23	3	1	3	3	1	3	0	0	0	29
		Cyanide	41	1	41	5	1	5	5	1	5	0	0	0	51

photograph from April 1985 was directly related to soil contamination.

Soil borings SB04 through SB12 are located within the main excavation area, which was backfilled with incinerated ash. All nine borings within the excavation area will be on a 100' x 100' grid. Borings SB05, SB06, SB07, SB09, and SB12 will extend to a depth of 9 feet, and borings SB04, SB08, SB10, and SB11 will extend to a depth of 5 feet. Two soil samples (0-2.5 and 2.5-5 feet) will be collected for chemical analysis from the 5-foot boring. Two soil samples also will be selected for chemical analysis from each of the 9-foot borings, but these borings will be screened with a PID as previously described and analytical samples will be collected from the 2.5-foot interval between 0 and 5 feet that exhibits the highest PID reading and from the 2-foot interval between 5 and 9 feet that exhibits the highest PID reading. If no PID readings above background are detected, analytical samples will be collected from the 2.5-5.0 foot interval and the 7-9 foot interval. A total of 18 investigative analytical samples will be collected from these nine borings and analyzed for TCLP metals and TAL total metals and cyanide. Samples from the 5-9 foot intervals in borings SB05, SB06, SB09, and SB12 will also be analyzed for TCL volatile organics, semivolatile organics, PCBs, and pesticides. Metals analyses are required because metals may be present in the ash. Potential sources of metals in the ash include residual from used oils handled by Lenz Oil Service, Inc. and residual from the metal containers that were shredded and incinerated. Any organics in the excavated soil fed to the incinerator would have been destroyed at the temperatures at which incinerators normally operate (1800-2200°F). Consequently, the shallow ash is not expected to contain organics and does not require organic analyses. The analytical data acquired from the shallow backfilled

incinerated ash will be used to confirm whether the quality of the backfill conformed to treatment standards. Ash in the lower portion of the excavation area may be contaminated with organic compounds if the liner has not kept ground water from infiltrating the backfill. Therefore, analytical data gathered from the lower portion of backfilled incinerated ash will include organic analyses and will be used to confirm the integrity of the liner.

Soil borings SB14, SB15, SB23, and SB16 are located east of the main excavation area (Figure 5-2). These soil borings will be located approximately 50 feet apart and will extend to bedrock. These borings will be drilled and screened with a PID as previously described. Analytical samples will be collected from the 2.5-foot intervals exhibiting the highest PID reading between the depths of 0-5 feet, 5-9 feet, and 9 feet to bedrock. Thus, three samples will be collected from each boring. If no PID readings above background are detected, samples will be collected from the 2.5-5.0 foot interval, the 7.0-9.0 foot interval, and the 2.5-foot interval immediately above bedrock. A total of twelve investigative samples from these locations will be analyzed for TAL metals and cyanide and TCL volatile organics, semivolatile organics, pesticides, and PCBs. The rationale for collecting these samples is to verify that the horizontal extent of excavation was sufficient in the eastern portion of the site.

Soil borings SB13, SB17, and SB18 are located in the former surface impoundment area, northeast of the main excavation area (Figure 5-2). These borings will be spaced approximately 50 feet apart and will extend to bedrock. These borings will be drilled and screened with a PID as previously described. Analytical samples will be collected from the 2.5-foot intervals exhibiting the highest PID reading between the depth of 0-5 feet, 5-9 feet, and 9 feet to

bedrock. Thus, three samples will be collected from each boring. If no PID readings above background are detected, samples will be collected from the 2.5-5.0 foot interval, the 7.0-9.0 foot interval, and the 2.5-foot interval immediately above bedrock. Nine investigative samples will be collected from the former surface impoundment area and analyzed for TCL volatile organics, semivolatile organics, PCBs, and pesticides and TAL metals and cyanide. The rationale for collecting these samples is to verify that the hot spot excavation conducted in the former surface impoundment area was sufficient and to determine the nature and extent of any residual soil contamination.

Soil borings SB19, SB20, SB22, and SB23 are located north and south of the main excavation area, along its perimeter. These borings will be drilled to bedrock and screened in 2.5-foot intervals with a PID as previously described. Analytical samples will be collected from the 2.5-foot intervals exhibiting the highest PID readings between the depths of 0-5 feet, 5-9 feet, and 9 feet to bedrock. If no PID readings above background are detected, analytical samples will be collected from the 2.5-5.0 foot interval, the 7.0-9.0 foot interval and the 2.5-foot interval immediately above bedrock. Three investigative samples will be collected from each boring, for a total of 12 samples. The samples will be analyzed for TCL volatiles, semivolatiles, PCBs, and pesticides and TAL metals and cyanide. The rationale for collecting these samples is to verify that the horizontal extent of excavation in the main excavation area was sufficient in the northern and southern portions of the site.

5.2.2 Site Characterization

5.2.2.1 Overview

The probable migration pathways by which contamination at the Lenz Oil site may migrate are ground water, surface water, and sediment. Each of these migration pathways will be evaluated as described below.

As discussed in Section 2.5 of this Work Plan, there is a major surficial aquifer underlying the Lenz Oil site that may be affected by surface/subsurface contamination. The surficial aquifer is a water table aquifer that encompasses the surficial glacial sediments and the underlying fractured bedrock. Monitoring wells, soil boring samples, water level measurements, in situ permeability tests, and geotechnical testing of soil samples will be used to characterize the ground water migration pathways. As discussed in Section 5.1.7 of this Work Plan, a survey of well records will be conducted during RI Phase 1, Task 1 to determine wells suitable for sampling. Suitable private water supply wells will be sampled during Phase II as a precaution to protect the public health and to provide information regarding the presence and extent of contaminant migration in the surficial aquifer. One (1) round of ground water samples will be collected from ground water monitoring wells installed during Phase I, Task 2 of the RI. Additional ground water samples will be collected from monitoring wells and appropriate residential wells, as described in the Phase II Work Plan, which will be reviewed and approved by USEPA and IEPA.

Contaminants may be migrating from the site via surface water and sediment, either by direct run-off or as a result of ground water discharge to the drainage ditch. Surface water and sediment from

the drainage ditch will be sampled and tested for contamination. Soil from both sides of the drainage ditch will also be sampled and analyzed for contamination to evaluate the source(s) of surface water and/or sediment contamination.

5.2.2.2 Objectives

The objectives of the site investigation for the Lenz Oil RI are as follows:

- Determine details of stratigraphy and geotechnical characteristics of subsurface materials at the site.

- Determine hydrogeologic conditions in the aquifers at the site, including vertical and horizontal flow rates and directions. These will be critical design information for the Feasibility Study.

- Characterize the interrelationship of area surface water features to the subsurface hydrogeology.

- Characterize the vertical and horizontal extent of ground water contamination attributable to the Lenz Oil site.

- Characterize the extent of surface water and sediment contamination attributable to the Lenz Oil site.

- Determine if private and municipal ground water use is potentially affected by contamination attributable to the Lenz Oil site.

5.2.2.3 Scope of Sampling

Site activities planned during Phase I, Task 2 include installation of monitoring wells, sampling of subsurface soil for geotechnical parameters, ground water sampling, surface water sampling, and sediment sampling. Ten 2-well monitoring clusters and one replacement monitoring cluster will be established on and downgradient of the site. Ground water samples will be collected from each of these monitoring wells and analyzed for TCL volatile organics, base neutral organics, acid extractable organics, and PCBs/pesticides and TAL metals and cyanide.

Due to the presence of a synthetic liner, placed by IEPA during the site ERA, monitoring wells will be placed immediately downgradient of the excavation. Soil sampling to be conducted in the area of excavation will not penetrate to the depth of the liner. In both cases, this is to preserve the integrity of the liner. This scope of investigation will be sufficient to design a remedy for the following reasons:

1. Once the site has been investigated, a conclusion can be reached as to whether any contamination which may have been left below the liner is above or below the water table.

2. Based on the above determination, predictive modeling would be used, as appropriate, to

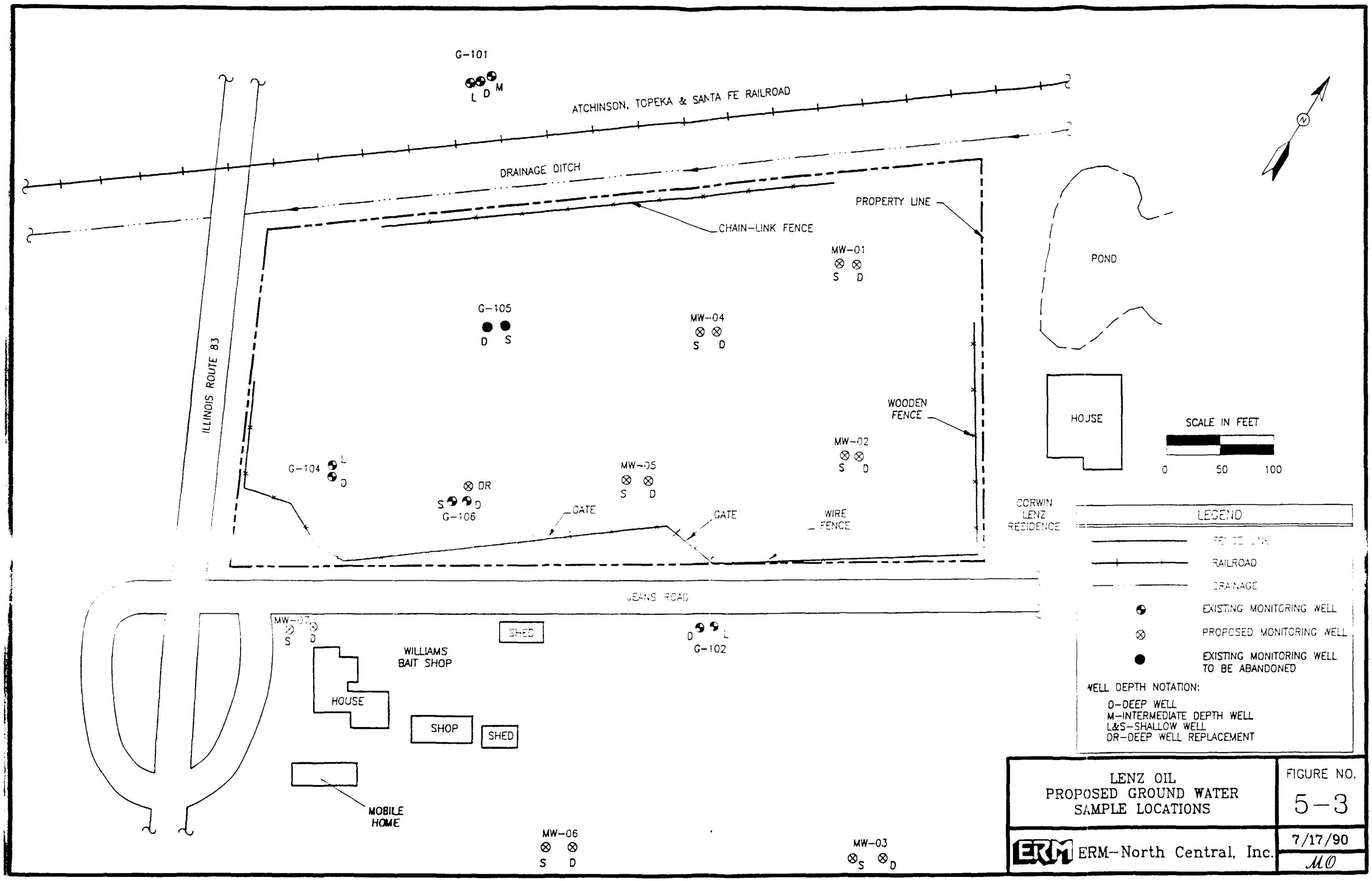
estimate the rate any residual contamination would leach from materials beneath the liner to the ground water, and subsequently to the downgradient monitoring wells.

3. As with all soil or ground water remediation efforts, the estimate of cleanup based on the above modeling would be re-evaluated once any remedy was operational.

Based on the results of the first round of analytical samples, an evaluation of the need for and scope of additional sampling to characterize the deeper portions of the surficial aquifer will be determined. This review will also include a determination of the need for and location of additional monitoring wells. Finally, based on the results of the ground water sampling at the site, appropriate private water supply wells (described in the USEPA and IEPA approved Phase II plan), which may be potentially impacted by contamination migrating from the Lenz Oil site, will be sampled. These samples will be analyzed for those chemical fractions (e.g., volatile organics, base neutral organics, acid extractable organics, PCBs/pesticides, metals, and cyanide that are attributable to the site.

5.2.3 Monitoring Well Installation

Evaluation of the surficial aquifer at the Lenz Oil site will be based on data collected from monitoring well clusters (Figure 5-3). Five well clusters (G-101, G-102, G-104, G-105, and G-106) already exist at the site and, to the extent possible, have been incorporated into the proposed monitoring well network. However, three of the existing wells (G-105S, G-105D, and G-106D) are either



LENZ OIL
PROPOSED GROUND WATER
SAMPLE LOCATIONS

FIGURE NO.
5-3

ERM ERM-North Central, Inc.

7/17/90

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nonfunctional or have questionable integrity. These wells will be abandoned in place in accordance with IEPA regulations. The wells in cluster G-105 are located within the main soil excavation area. In order to avoid the risk of puncturing the visqueen liner at the base of the excavation, these wells will not be replaced with new wells. The deep well in cluster G-106 is not in the excavation area and will be replaced with a new deep monitoring well.

The existing monitoring well network will be supplemented with seven additional two-well clusters. The additional well clusters will be located downgradient and surrounding the primary source of contamination in order to assess the severity, extent and fate of ground water contamination. Preliminary locations of the monitoring well clusters have been selected (Figure 5-3), but these locations may be revised as a result of field conditions and/or fracture analysis and soil gas findings.

Each new monitoring well cluster will consist of a water table well and a deep well completed with the top of the screen 30 feet below the water table if significant bedrock fractures are present at that depth. If fractures are not present at that depth or at a slightly shallower depth, these boreholes will be advanced until significant fractures are encountered. The wells will then be set so that they are open to these fractures.

All of the new monitoring wells will be constructed with stainless steel screens and risers. Ten-foot screens will be used for water table wells and five-foot screens will be used for deep wells. The tops of the water table screen will be placed three feet above the water table at the time of installation. The procedures used to install the monitoring wells are described in the Sampling and Analysis Plan.

5.2.4 Site-Specific Fracture Analysis

Cores of the bedrock collected during monitoring well installation will yield the most reliable, site-specific fracture data available from the Lenz Oil site. The cores will be carefully described with respect to fracture width, spacing, interconnectedness and orientation with respect to the ground surface. These data will be compiled, mapped and statistically analyzed for trends. The site-specific fracture data will be interpreted in the context of the regional fracture network described in Task 1 and specific structural and stratigraphic trends that control local ground water flow will be identified.

5.2.5 Aquifer Characterization

The hydraulic characteristics of the surficial aquifer will be determined from geotechnical testing of the aquifer materials and in situ permeability testing. Rising head permeability tests will be conducted on all the monitoring wells. Packer tests may be conducted on sections of the bedrock aquifer in order to estimate the hydraulic conductivity at different depth intervals in the bedrock, if it is possible to conduct the tests prior to well installation and without compromising ground water quality or well integrity. Grain size and total porosity analyses will be performed on representative soil samples from each well cluster. The total organic carbon (TOC) content of the soil samples will also be determined so that the partitioning properties of the soil can be calculated.

Monthly ground water elevation measurements will be collected to characterize horizontal and vertical flow gradients. Surface water elevations in the Des Plaines River and the Sanitary and Ship Canal

will also be measured and tied into the ground water elevations to assess recharge and discharge potentials. A stream gage will be installed on the north side of the Des Plaines River at the Route 83 bridge, and another stream gage will be placed on the Chicago Sanitary and Ship Canal at the Route 83 bridge. These gages will be surveyed by a licensed surveyor, and the elevations will be tied to Mean Sea Level (MSL) via a nearby benchmark to facilitate comparison with regional data and maps. Elevations will be surveyed to the nearest 0.01 foot. Each individual round of water level measurements will be conducted within a 24-hour period.

5.2.6 Ground Water Sampling

One round of ground water samples will be collected from the monitoring wells installed during Phase I, Task 2 and the remaining wells installed by the IEPA (i.e., a total of 23 monitoring wells). Prior to sampling, each well will be purged until stabilization of temperature, specific conductivity, and pH is achieved to ensure ground water samples that are representative of natural aquifer conditions. The volume of water purged will be no less than three well casing volumes and no more than five well casing volumes. Monitoring wells will be purged by bailing or pumping, and ground water samples will be collected using Teflon bailers. These samples will be analyzed for the TCL volatile organics, semi-volatile organics, and PCBs/pesticides and TAL metals and cyanide. One field blank and one duplicate sample will be obtained for every 10 ground water samples collected. Details of the sampling procedures are contained in the Sampling and Analysis Plan.

All ground water samples, duplicate samples, and field blank samples will be analyzed for TCL organic compounds and TAL metals and cyanide using CLP protocol. The samples will be shipped by

overnight carrier to ARDL in Mount Vernon, Illinois. Notice will be given to the U.S. EPA and IEPA at least 10 days prior to sampling monitoring wells and both agencies will be permitted to split samples.

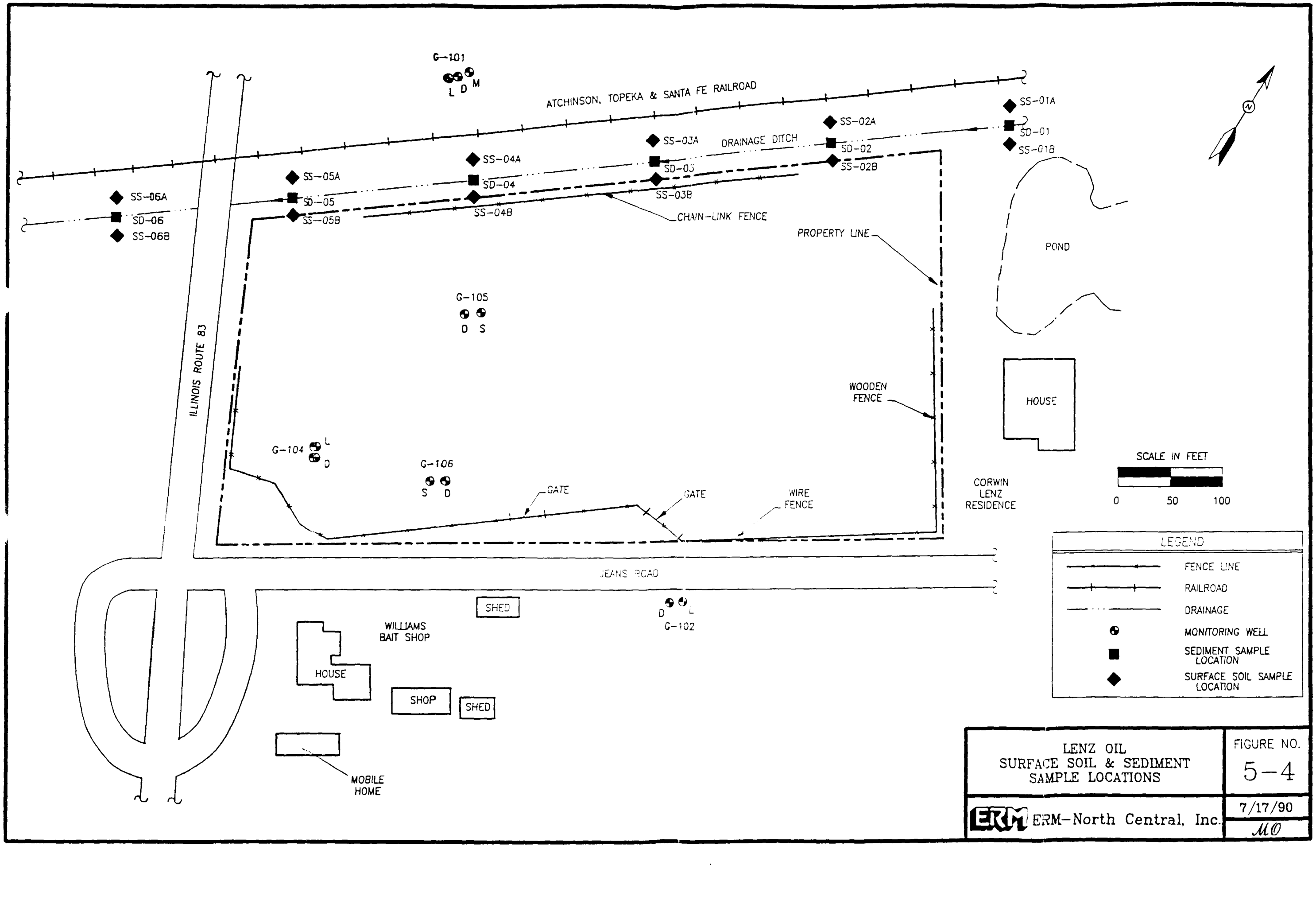
5.2.7 Private Well Sampling

As appropriate, private well samples will be collected subsequent to the Phase I, Task 2 Round 1 monitoring well sampling event. The appropriate wells will be described in the USEPA and IEPA approved plan for Phase II activities.

Private wells will be purged with the installed pump or a hand pump, if the installed pump no longer exists. Purging will continue until stabilization of temperature, specific conductivity, and pH is achieved, and the volume purged will be no less than three well casing volumes and no more than five well casing volumes. One field blank and one duplicate sample will be obtained for every 10 private well samples collected. These samples will be analyzed for the suites of TCL and/or TAL parameters detected in the monitoring well samples and will be shipped to the same laboratory. The U.S. EPA and IEPA will be notified at least two weeks prior to sampling the private wells, and both agencies will be invited to split samples.

5.2.8 Sediment and Surface Soil Sampling

Sediment and surface soil samples will be collected along the drainage ditch northwest of the Lenz Oil site in order to evaluate potential releases of contamination to the drainage system. Six sediment samples and 12 surface soil samples will be collected (Figure 5-4). The sediment samples will include one upstream



LENZ OIL SURFACE SOIL & SEDIMENT SAMPLE LOCATIONS	FIGURE NO. 5-4
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Oil site. These materials will be sampled and analyzed according to procedures reviewed and approved by the U.S. EPA and IEPA. Disposal of these materials will likewise follow U.S. EPA and IEPA guidance. Approval to discharge containerized water to the local sanitary sewer system has already been granted by William Bowles, supervisor of the wastewater treatment plant (Dmyterko, 1988). Approval was based on previous discharges received from IEPA drilling and sampling operations at the Lenz Oil site.

5.2.11 Technical Memorandum 3

Technical Memorandum 3 will be prepared upon completion of the site investigation field work once all analytical data have been reviewed and validated to document actual activities and present findings. The technical memorandum will address, at a minimum, the following subjects:

- A description of site activities during Task 2, including soil sampling, well installation, ground water sampling, fracture analyses, aquifer testing, sediment sampling, and surface water sampling.

- A summary of soil and rock screening results from monitoring well installation activities.

- Hydrogeologic conditions in the study area; identification and characterization of soil stratigraphy and areal relationships of soil deposits; identification and characterization of hydrostratigraphic units and areal relationship; evaluation of ground water flow

systems, flow directions, flow rates and recharge-discharge distribution.

- All soil sampling results from the source characterization activities.

- Sampling and analysis results from ground water samples; identification of contaminant levels in the hydrostratigraphic units investigated both on- and off-site; evaluation of potential contaminant migration across the site boundary and into the water supply aquifer.

- Sampling and analysis results of surface water and sediment samples; identification of on-site contaminant levels; evaluation of off-site contaminant migration.

5.2.12 Phase II Work Plan

Concurrent with the submittal of Technical Memorandum 3, a proposed Work Plan for Phase II activities will be presented to the USEPA and IEPA for their review and comments.

The Work Plan for Phase II will include a schedule for Phase II activities and the completion of the RI/FS. All schedule items following Phase II, from production of the Draft RI to completion of the FS, will be contingent on the scope and schedule for Phase II.

sample, one downstream sample, and four samples equally spaced along the drainage ditch opposite the Lenz Oil site. Surface soil samples will be collected from both banks of the drainage ditch, midway between the slope crest and the drainage channel at each location along the drainage ditch that a sediment sample is collected.

The proposed scope of samples will evaluate the magnitude and extent of contamination in the drainage sediment and whether or not the contamination has migrated off-site. Furthermore, the upstream sediment sample and the soil samples from along the banks of the drainage ditch will be used to identify the pathway and source(s) of any contamination entering the drainage ditch in the vicinity of the Lenz Oil site. The locations of the soil and sediment samples may be changed in the field if on-site inspections indicate better data would be obtained by relocating the sample points. All sampling locations will be approved in the field by IEPA and U.S. EPA representatives prior to sample collection.

One duplicate sediment sample, one duplicate surface soil sample, and one MS/MSD sample will be obtained for QA/QC purposes. These samples will be analyzed for TCL volatile organic compounds, semi-volatile compounds, and PCBs/pesticides and TAL metals and cyanide. Further details of the sampling procedures are contained in the Sampling and Analysis Plan.

All sediment and surface soil sampling activities will be conducted by the IEPA Project Team or its contractor. U.S. EPA will be permitted to split surface soil and sediment samples with the project team. Samples will be shipped via overnight carrier to ARDL Laboratories, where they will be analyzed using CLP procedures.

5.2.9 Surface Water Sampling

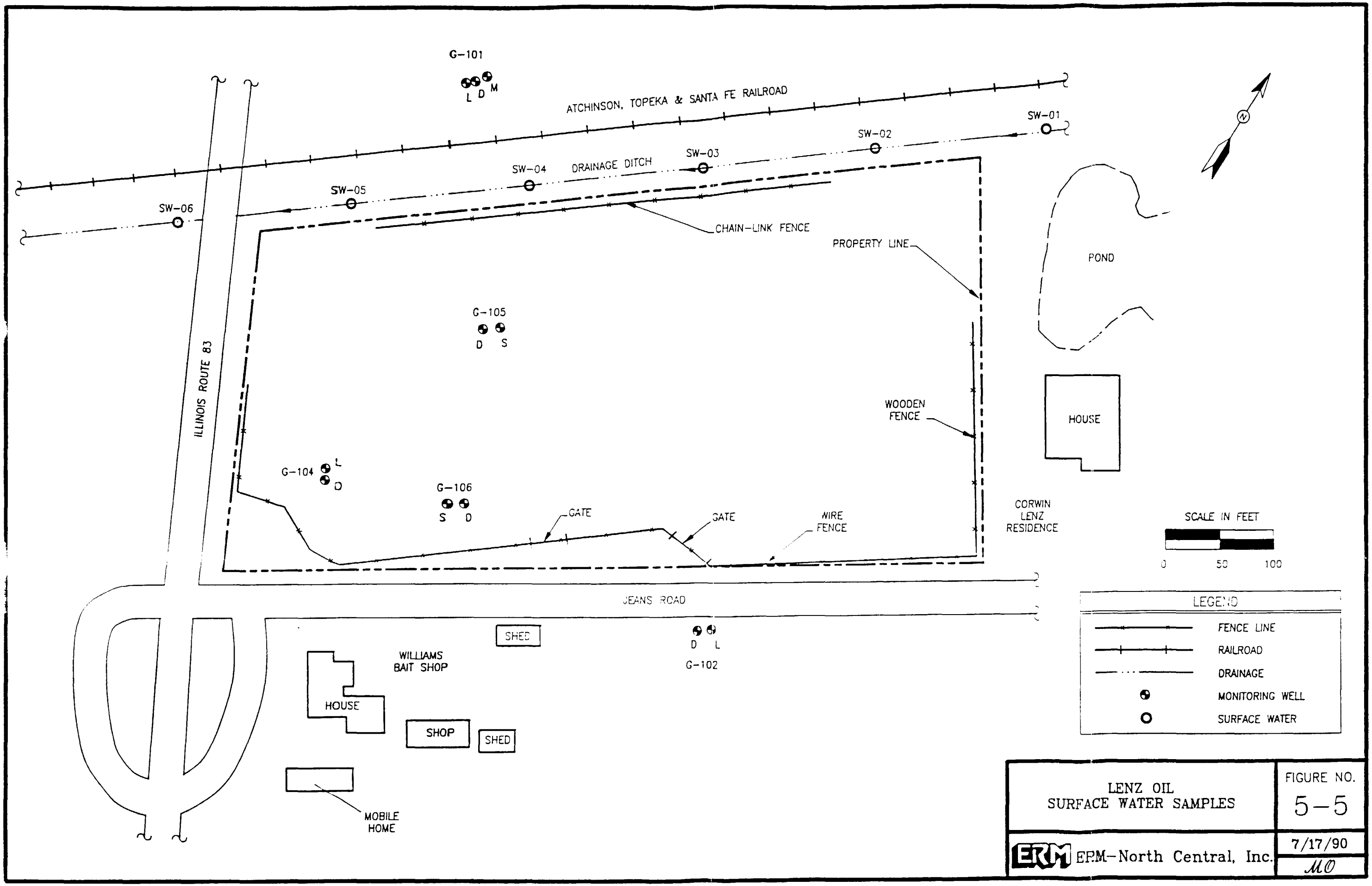
Surface water samples will be collected along the drainage ditch northwest of the Lenz Oil site to evaluate potential releases and migration of contamination to the local surface water system. Six surface water samples will be collected: one upstream sample, one downstream sample, and four samples equally spaced will be taken along the drainage ditch opposite the Lenz Oil site (Figure 5-5). The surface water samples will be collected from the same locations as the sediment samples.

The proposed scope of surface water sampling will evaluate the magnitude and extent of contamination in the drainage water and whether or not the contamination has migrated off-site. Potential upstream contamination will be evaluated with the upstream sample and potential pathways of on-site contaminant migration will be evaluated by the four samples collected opposite the site.

One field blank, one duplicate sample and one MS/MSD sample will be collected for QA/QC purposes. All of the surface water samples and associated QA/QC samples will be analyzed for TCL organic compounds and TAL metals and cyanide using CLP protocol. The samples will be shipped to ARDL Laboratories for analysis. Details concerning sampling procedures are described in the Sampling and Analysis Plan.

5.2.10 Drilling Spoils and Decontamination Byproduct Sampling

All drilling spoils, contaminated drilling fluid, development water, purge water, wash water, and excess sample portions will be placed in 55-gallon drums and stored in a secure area on the Lenz



LENZ OIL SURFACE WATER SAMPLES	FIGURE NO. 5-5
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5.3 RI Phase I, Task 3 - Site Investigation Analysis

5.3.1 Data Validation and Sufficiency Evaluation

During the initial phase of this task, a quality assurance and data sufficiency evaluation for the RI will be performed to verify that the data generated are of sufficient quantity and quality to support an ATSDR Public Health Assessment, an Endangerment Assessment, and a Feasibility Study. All of the procedures utilized in acquiring these data will be reviewed to ensure that Quality Assurance/Quality Control (QA/QC) has been maintained and that laboratory data will be validated to ensure that data quality meets the requirements of the Quality Assurance Project Plan (QAPP) and U.S. EPA guidance documentation such as "Laboratory Data Validation Functional Guidelines" (R-582-5-5-01). Once the data validation and QA/QC subtask is completed, a QA/QC and data sufficiency evaluation will be prepared and submitted to U.S. EPA and IEPA as a technical memorandum attached to the Draft RI Report.

5.3.2 Data Analysis and Summary

Concurrent with and subsequent to the data sufficiency review, a thorough analysis and summary of all site investigations and results will be prepared for presentation in the RI final report. The organization of data for that report will follow the "U.S. EPA Guidance Manual on Remedial Investigation" (EPA/540/G-85/004, October, 1988). All site investigation data will be analyzed, and a summary interpretation will be developed for the type and extent of contamination of the site. Technical memoranda developed during the Remedial Investigation will be included as appendices to the RI report.

5.3.3 Contaminant Pathway and Transport Evaluation

This task will involve the identification of contaminant transport pathways. The pathways that will be investigated include soil (unsaturated zone), ground water, surface water, and air. The evaluation developed under this task will be used as the basis for the work to be conducted for the Endangerment Assessment.

5.3.3.1 Unsaturated Soil Zone

Numerous soil samples will be collected during the on-site Remedial Investigation. The soil sampling survey is described in detail in the IEPA Sampling Plan for the Lenz Oil site (Appendix A). The information that will be collected and used to evaluate contaminant pathways and transport pathways includes the following:

- The types of contaminants present.
- The extent of contamination, both horizontal and vertical (i.e., delineation of contaminant zones).
- Physical properties of contaminants present such as solubility, density, vapor pressure and air to water partitioning coefficient.
- Contaminant amenability to soil absorption/adsorption.

This type of information will allow a determination to be made concerning what direction (i.e., pathways) contaminants are migrating from the Lenz Oil site. Data will also aid in

determining whether the contaminants are being transported through the unsaturated soil zone into the ground water or being attenuated in the soil.

5.3.3.2 Ground Water

Information gained through ground water sampling will allow the identification of the type and extent of ground water contamination, if any, both on-site and off-site. Specific characteristics as outlined above in association with in situ permeability data, geotechnical data, and ground water flow data will allow a determination of such items as:

- Projected direction and rate of contaminant transport in the ground water system.
- Estimated volume of contaminated ground water (and extent of contaminants) present.
- Contaminant transport mechanisms in the unsaturated and saturated zones.
- Estimated duration of contaminant source, predicted using modelling such as the USEPA HELP model.
- Prediction of the ultimate fate for contamination attributable to the Lenz Oil site.

5.3.3.3 Surface Water/Sediment

Surface water and sediment sampling will also be conducted along the drainage ditch northwest of the Lenz Oil site during the Remedial Investigation. These data will be used to determine the off-site migration of contaminants. Migration could be occurring via one of the following pathways:

- Surface water infiltration into surface soils followed by recharge of the drainage ditch with contaminated ground water;
- Contaminated storm water run-off from the Lenz Oil site onto adjacent property;
- Contaminated storm water run-off from the Lenz Oil site directly into the drainage ditch.

5.3.3.4 Air

Based on the review of existing information (e.g., the Hazard Ranking System scores) the ambient air is not considered to be a contaminant pathway and no air sampling is proposed. However, during excavation and boring operations planned for the Remedial Investigation, it is possible that contaminated surface soil particles (i.e., fugitive dust) and volatile organic emissions from waste material disposal and spill areas will be released in the vicinity of the drilling or excavation area. Therefore, air monitoring for personnel protection will be conducted as detailed in the Health and Safety Plan.

5.3.4 Endangerment Assessment

An endangerment assessment will be conducted to evaluate the potential threat to human health and the environment resulting from no further remediation at the Lenz Oil site. This assessment will provide the basis for determining whether or not remedial action is necessary as well as the justification for performing remedial actions. Detailed guidance on conducting endangerment assessments, as provided in the U.S. EPA "Risk Assessment Guidance for Superfund, Part A, Human Health Evaluation Manual," Interim Final, December 1989 and "Volume 2, Environmental Evaluation Manual," Interim Final, March 1989, will be followed.

The objectives of this endangerment assessment will be satisfied by identifying and characterizing the following:

- Toxicity and quantity of hazardous substances present in ground water.

- Environmental fate and transport mechanisms affecting contaminant migration in ground water. Among the factors to be considered are physical, chemical, and biological degradation processes as well as hydrogeologic conditions such as aquifer thickness and extent, type of porosity (intergranular vs. fractures), permeability, hydraulic conductivity, flow direction, aquifer lithology and carbon content, and discontinuities in the aquifer.

- Potential exposure pathways and the extent of actual or expected exposure. Among the

pathways to be considered are wells utilizing the aquifer of concern and surface water bodies receiving ground water discharged from the aquifer of concern.

- The number and proximity of potential human and environmental receptors.

- Extent of expected impact or threat and the likelihood of such impact or threat occurring.

- "Acceptable" levels of exposures based on regulatory and toxicological information.

The goal of the endangerment assessment is to gather sufficient information to adequately, and as accurately as possible, characterize the potential risk from the site, and to conduct this assessment as efficiently as possible. The risk assessment process can be divided into four components: (1) contaminant identification, (2) exposure assessment, (3) toxicity assessment, and (4) risk characterization.

The objectives of contaminant identification are to screen the information that is available on hazardous substances or waste present at the site and to identify contaminants of concern to focus subsequent efforts in the endangerment assessment process. Contaminants of concern may be selected because of their intrinsic toxicological properties, because they are present in large quantities, or because they are present in potentially critical exposure pathways. Indicator chemicals may be used as a part of this process to represent the most toxic and/or mobile substances

among those identified or those substances for which the best information is available.

An exposure assessment will be conducted to identify actual or potential exposure pathways, to characterize the potentially exposed populations, and to determine the extent of the exposure. Objectives are developed by identifying the exposure pathways, analyzing exposed populations, and estimating expected exposure levels. Detailed guidance presented in the U.S. EPA document Superfund Exposure Assessment Manual, dated April, 1988, will be followed in addressing these objectives.

To assess the toxicity contamination attributable to the site, acceptable levels of contamination will be compared with actual identified levels. Contaminant-specific ARARs (Applicable or Relevant and Appropriate Requirements), when available, will be used to determine acceptable levels. When ARARs are not available or ARARs represent a risk greater than 10^{-4}, acceptable levels will be based on concentration levels that would yield exposures less than or equal to reference doses for non-carcinogens and specified risk levels based on potency factors for carcinogens. The preliminary goals for carcinogens will be based on the risk range of 10^{-4} to 10^{-7} excess lifetime cancer risk. Other available values may be useful in establishing final chemical-specific cleanup levels.

During the final component of the risk assessment process, risk characterization, the potential for adverse health or environmental effects will be estimated for each of the exposure scenarios derived in the exposure assessment. The estimates will be obtained by integrating information developed during the exposure and toxicity assessments to characterize the potential of actual risk

including carcinogenic risk, non-carcinogenic risk, and environmental risk. The final assessment will include a summary of the risk associated with the site, including each projected exposure route for contaminants of concern and the distribution of risk across various sectors of the population.

The endangerment assessment will be based exclusively on analytical data subjected to approved QA/QC procedures. Moreover, the results of any data processing or technical interpretation, including transport modelling, exposure assessment, and toxicity assessment, will also be subject to a quality assurance review.

5.4 RI Phase I, Task 4 - Laboratory and Bench-Scale Studies

During the development and initial screening of alternatives conducted as part of the Remedial Investigation, specific laboratory and bench-scale studies, or modelling may be identified as necessary to determine implementability, operability, reliability, and effectiveness of any particular alternatives with respect to site problems. The need for, design of, and implementation of any laboratory or bench-scale testing will be discussed with the U.S. EPA and IEPA during the progress of the Remedial Investigation to ensure that necessary data are available for conducting the Feasibility Study.

The primary focus of any activity under this task may be treatability studies and compatibility studies. Treatability investigations may include the evaluation of waste fixation technologies to evaluate containment as well as physical/chemical or biological processes to determine loading effectiveness, sizing, and material requirements for treatment facilities. Compatibility

studies may be necessary to evaluate remedial alternatives that incorporate the use of contaminant migration barrier walls. In addition, the synergistic reactions that may occur when different waste materials or contaminants are combined during treatment or decomposition require evaluation.

A testing plan will be submitted to U.S. EPA and IEPA identifying the purpose of the study, level of effort needed, and guidelines for interpretation and data management. A separate technical memorandum will be prepared upon completion of Task 4 to summarize the results of the laboratory and bench-scale treatability studies.

5.5 RI Phase I, Task 5 - Remedial Investigation Report

At the conclusion of the RI, a draft Remedial Investigation report will be produced to summarize conclusions drawn from all investigative areas and levels. All technical memoranda submitted during the RI will be included as appendices to the RI report.

5.5.1 Progress Reports

Monthly progress reports will be prepared to describe the technical progress of the RI. These reports shall be submitted to the USEPA and IEPA by the tenth business day of each month, following the commencement of the work detailed in the RI/FS Work Plan. The monthly progress reports shall include the following information:

- All sampling and testing results and all other raw data produced during the month pursuant to the implementation of the Administrative Order by Consent;

- A description of activities completed during the past month pursuant to the Administrative Order by Consent, as well as such actions and plans that are scheduled for the next month pursuant to the Administrative Order by Consent;

- A description of difficulties encountered during the reporting period and the actions taken to rectify the problems;

- Target and actual completion dates for each element of activity, including the project completion, and an explanation of any deviation from the schedules provided in the RI/FS Work Plan; and

- Changes in key personnel.

5.5.2 Technical Memoranda

The results of specific remedial investigation activities, including the Description of the Current Situation, the soil gas investigation and the site characterization, will be submitted in draft form to the U.S. EPA and the IEPA throughout the RI process. All responses to U.S. EPA and IEPA comments concerning memorandum issues will be addressed in letters from the Respondent Project Coordinator to the USEPA Remedial Project Manager and will be summarized in the draft RI report. The specific technical memorandums and their associated schedule of submittal have been identified in this Work Plan.

5.5.3 Draft Remedial Investigation Report

The following is a summary of the draft RI report contents:

- EXECUTIVE SUMMARY

  Key information and major investigative findings will be briefly summarized to provide a concise overview of site characterization, contaminant pathways, and Endangerment Assessment.

- INTRODUCTION

  The introduction section will address four areas: (1) site background information, (2) the nature and extent of contamination at the site, (3) the investigation objectives and activities, and (4) an overview of the report contents. This section will review significant features and parameters of the site that are required to characterize site contamination, and contaminant pathways, and to select remedial action alternatives.

- SITE FEATURES INVESTIGATION

  The following significant features of the site will be summarized: (1) demography, (2) land use (3) natural resources, and (4) climatology. Discussion of each area will include key parameters investigated and

analyzed for and all information pertinent to the applicability of remedial alternatives.

- HAZARDOUS SUBSTANCES INVESTIGATION

  This section will be organized into two subsections: (1) waste types, and (2) waste component characteristics and behavior. The first subsection will address waste quantities, location, components, containment, and composition based on available data and records. It will cover all source areas located on-site as well as any materials affected by a remedial action or contaminant migration. The second subsection will summarize the results of the analysis of contaminant characteristics, including toxicity, bioaccumulation, metabolism, environmental transformation, or other characteristics.

- HYDROGEOLOGIC INVESTIGATION

  The hydrogeologic investigation will summarize information and data collected on the soil, geology, and ground water of the site. The soil analyses will include all soil data collected during the RI and descriptions that characterize the site that would affect decisions on remedial alternatives. The geology section will summarize geologic features and site characteristics that have

potential impacts on choosing remedial solutions. The ground water assessment will include the direction of ground water flow, the delineation of the contaminant plume, plume migration, ground water velocities as related to plume migration, and aquifer systems underlying the site. Results of any ground water modelling activities will be presented in this section. This section also identifies levels of contamination.

- SURFACE WATER/SEDIMENT INVESTIGATION

  This section will summarize data collected regarding the surface water and sediment in the small drainage ditch adjacent to the site and the Des Plaines River relative to contaminant migration.

- BENCH AND PILOT STUDIES

  Results of any bench-scale or pilot-scale testing conducted during the RI will be summarized in this section. These test results will provide data for the selection and design of remedial alternatives.

- ENDANGERMENT ASSESSMENT

  The Endangerment Assessment will present demographic, physical, chemical, and biological factors at the site used to

determine if there is a risk to public health or environment, in the absence of any remedial actions. The following factors will be evaluated and summarized: (1) specific contaminants, (2) factors affecting migration, (3) environmental fate of contaminants, (4) exposure evaluation, (5) toxicity evaluation, (6) environmental impact and (7) risk characterization.

- CONCLUSION AND FEASIBILITY STUDY OVERVIEW

  Major conclusions from the site characterization, contaminant transport analysis, and Endangerment Assessment of the RI will be presented in this section. Based on these conclusions, a list of preliminary remedial alternatives will be identified, evaluated, and summarized. This list of preliminary remedial alternatives will be submitted as a separate technical memorandum to U.S. EPA and IEPA.

- APPENDICES

  The text of the RI report will summarize information collected and analyzed during the investigative process. However, the text will not constitute a detailed description of sample collection, data gathering, and all analytical data. These items will be presented in technical memoranda generated

during the RI, which will be attached as appendices to the RI report.

5.5.4 Agency Review

Copies of the draft RI report will be submitted to U.S. EPA and the IEPA for review and comment. Upon receipt of the agencies' comments, a final report will be prepared and submitted in accordance with Section IX of the Lenz Oil Administrative Order by Consent. The RI report will not be considered final until a letter of approval is issued by the U.S. EPA Remedial Project Manager.

5.6 Task 6 - Community Relations Support

Community relations activities performed during the Remedial Investigation will be implemented jointly by USEPA and IEPA in accordance with the Administrative Order by Consent. The Respondents and their contractor will cooperate with the USEPA and the IEPA as provided in the Administrative Order by Consent.

6.0 FEASIBILITY STUDY TASKS

The purpose of the Feasibility Study (FS) is to develop alternative remedial actions, based upon the results of the RI, that will mitigate impacts to public health and welfare, and the environment. The FS for the Lenz Oil site will consist of the identification, development, and evaluation of alternative remedial action plans based on engineering feasibility, environmental impact, and cost criteria. As a result of this process, an alternative action or a combination of alternatives will be selected that will be cost effective, reliable, and implementable. The development of alternatives will require a definition of site-specific remedial response objectives, and the identification of available and appropriate alternative actions.

Site-specific remedial action objectives for the Lenz Oil site will be established in consultation with the U.S. EPA and IEPA. These objectives will be based on the Endangerment Assessment completed during the RI, and criteria for achieving these objectives will be developed in consultation with the U.S. EPA and IEPA. At a minimum, these criteria will include compliance with 40 CFR 300.68 of the National Contingency Plan (NCP), Section 121 of the Superfund Amendment and Reauthorization Act of 1986 (SARA), U.S. EPA and IEPA guidelines, and applicable federal and/or state laws.

The FS for the Lenz Oil site will consist of three primary tasks with multiple subtasks. The primary tasks include:

Task 7 - Remedial Alternatives Screening
Task 8 - Remedial Alternatives Evaluation
Task 9 - Feasibility Study Report

The following sections describe the planned technical approach designed to conduct each of these tasks and their subtasks.

6.1 Task 7 - Remedial Alternatives Screening

Task 7 entails the development and preliminary screening of feasible technologies to remediate the site and is comprised of several subtasks. When these subtasks are completed, an alternatives array document will be prepared and submitted as a separate technical memorandum to the U.S. EPA and the IEPA for their review, comments, and approval. This technical memorandum will contain a brief site background description, significant RI results, and a detailed description of the proposed remedial alternatives including the expected extent of remediation, contaminant levels, and the treatment methods. The results of this task will provide a basis for the development of the standards of performance required by the IEPA and the U.S. EPA.

A copy of this document will be provided to the IEPA for the purpose of obtaining Applicable, Relevant and Appropriate Requirements (ARARs), and a request will be made for notification of standards.

Potentially feasible technologies identified during Task 7 will include on-site and off-site remedies. An initial list of technologies will be screened based on site conditions, waste characteristics, implementation difficulties, unreasonable implementation schedules, and the state of development of the technologies. Emerging or state-of-the-art technologies will be evaluated and may be carried through this screening process even if insufficient data exist to provide a full evaluation.

Site-specific remedial response objectives for the FS will be established to evaluate remedial alternatives in accordance with U.S. EPA "Guidance For Conducting Remedial Investigations and Feasibility Studies Under CERCLA Interim Final," October 1988. These objectives will be based on potential risk to human health and the environment, RI data, the results of the Endangerment Assessment, the Revised NCP, ATSDR Public Health Assessment, U.S. EPA interim guidelines, ARARs, as well as guidelines and advisories as defined under Section 121 of SARA. Preliminary cleanup standards and objectives will be developed in formal consultation with the U.S. EPA and the IEPA.

Alternative remedial actions will then be developed that incorporate the identified available technologies and are responsive to the established site-specific remedial response objectives. Alternatives to be developed include: (1) treatment alternatives for source control that will eliminate the need for long-term management (including monitoring) and (2) treatment alternatives that will reduce the toxicity, mobility, or volume of contamination at the Lenz Oil Site. At a minimum, the following two additional alternatives will be included:

1. An alternative that involves in-situ containment of contaminated soil and ground water with little or no treatment, provided human health and the environment is protected by preventing potential for exposure or reducing the mobility of the waste.

2. A no action alternative.

For ground water response activities, a number of alternatives will be developed that reduce the potential of cancer health risk attributable to the Lenz Oil site to within the range of 10^{-4} to 10^{-7} for maximum lifetime risk including different rates of restoration. Where feasible, at least one alternative will be included that would restore ground water to a 10^{-6} maximum lifetime cancer risk level within five years of implementation.

Combinations of remedial alternatives that take into account the previously implemented source control measures will be evaluated to ensure that the comprehensive remedial action is effective and the source and ground water restoration elements are complementary. However, each element will be detailed separately in the development and analysis of alternatives.

The final subtask will be to subject the identified alternatives and associated technologies to a preliminary screening to narrow the list of candidates for the detailed analysis. The effectiveness, implementability, and cost for each alternative will be considered. The effectiveness evaluation will determine if an alternative: (1) adequately protects human health and the environment; (2) attains federal/state ARARs or other criteria or guidance; (3) significantly and/or permanently reduces the toxicity, mobility, or volume of hazardous constituents; and (4) is technically reliable (including the potential for failure and a need for replacement of the remedy). Implementability will be based on the feasibility and availability of the technologies for each alternative. This includes both the technical and the institutional abilities to monitor, maintain, and replace technologies over time and the administrative feasibility of implementing the alternative.

Finally, the cost of construction, long-term operation, and maintenance will be evaluated for each alternative. During the initial screening, cost will be a significant factor in comparing alternatives that provide similar results. However, cost will not be used to compare treatment versus nontreatment alternatives.

The objectives for screening alternatives will be used through the remainder of the FS with the most promising alternatives based on effectiveness and implementability. Alternatives chosen for more detailed analysis must also satisfy the requirements for treatment alternatives that eliminate long-term management or reduce the toxicity, mobility, and volume of site waste. State-of-the-art or innovative alternative technologies will be carried through the screening process if they offer potential for better treatment performance or implementability, fewer or lesser adverse impacts than other alternatives, or lower costs than other alternatives while achieving similar levels of performance. The containment and no action alternatives will be carried through the initial screening to the detailed analysis.

A program for community relations support will be developed. The program will be consistent with the Community Relations Program developed under Task 6 and with the conditions set forth in the Administrative Order by Consent.

Data requirements specific to the relevant and appropriate technologies will be identified. These requirements will focus on providing the data needed for the detailed evaluation and development of a preferred alternative.

6.2 Task 8 - Remedial Alternatives Evaluation

Upon completion of Task 7, three subtasks will be necessary to complete the evaluation of remedial alternatives for the Lenz Oil site. The initial subtask will be to evaluate each proposed alternative in terms of the criteria outlined in Section 4.3. Secondly, alternatives will be compared and ranked using the evaluation criteria. Finally, the proposed alternatives will be discussed in detail with respect to all review criteria. This discussion will be a separate chapter in the FS Final Report. In the case of combined alternatives, this discussion will present the rationale supporting the combination and discuss the inter-relationship between the components of the combined remedy.

The detailed evaluation of alternatives will consist of a detailed description of the alternatives; specific federal and state ARARs; and other criteria, advisories, or guidelines to be used in the selection of remedies. As a result of this detailed analysis, a site remedy will be selected from a well-defined set of hazardous waste management approaches.

The alternatives will then be compared for their technical effectiveness, implementability, and costs. A detailed analysis within these major criteria will include the following specific review criteria:

- Degree to which the alternative is protective of human health and the environment;
- Compliance with ARARs and justification for any required ARAR waivers;

- Long-term effectiveness and permanence of alternatives in maintaining protection of human health and the environment;

- Short-term effectiveness of alternatives in protecting human health and the environment during construction and implementation of the remedy;

- Degree to which the mobility, toxicity, or volume of the contaminant source is reduced;

- Implementability (the technical and administrative feasibility of alternatives and the availability of required goods and services); and

- Cost of implementation, operation and maintenance of the alternatives.

In instances where health-based criteria are not available, risk assessments will be used to establish levels appropriate for the site. For ground water response actions, the potential for further migration of any contaminant and the technical limits of aquifer restoration will be necessary for review factors.

Cost component review criteria will include an evaluation of short-term capital and operational costs, and any long-term operation/ maintenance costs. A present value cost analysis will also be used to compare alternatives.

Once the detailed review of each alternative is completed, alternatives will be compared one to another. Combinations of alternatives that complement each other with respect to technical effectiveness and operational compatibility will be developed and evaluated. Combinations of remedial alternatives will be compared by using the same criteria applied to individual alternatives.

6.3 Task 9 - Feasibility Study Report

The FS Report will summarize the findings of Tasks 7 and 8 and present a full and detailed description of the preferred remedy for the site. This report will be prepared in accordance with the U.S. EPA's "Guidance on Feasibility Studies Under CERCLA" (EPA/540/G-89/004), October, 1988. Copies of the draft FS Report will be submitted to the U.S. EPA and the IEPA for review and comment.

Upon receipt of the Agencies' comments, a final report will be prepared and submitted in accordance with Section IX of the Lenz Oil Administrative Order by Consent. The FS Report will not be considered final until a letter of approval is issued by the U.S. EPA Remedial Project Manager.

7.0 SCHEDULE

If all necessary site access agreements have been obtained, Phase I, Task 1 of the Lenz Oil RI/FS will begin the day following final approval of all Work Plan documents. The schedule for completion of the Scope of Work defined in this Work Plan is presented on Table 7-1 and Figure 7-1. The anticipated start and completion dates for each major project task are indicated as the number of weeks from the final approval of the Work Plan. The estimated time of the completion of the RI/FS is approximately 75 weeks, with approximately 57 weeks to complete the Remedial Investigation and approximately 38 weeks scheduled for completing the Feasibility Study. There is a 20-week overlap between the approval of the final RI Report and initiation of the FS.

The anticipated dates for the drafts, and final submittals of all deliverables, including the RI and FS reports, are indicated on Table 7-1 and Figure 7-1.

All dates for deliverables from and including the Draft RI Report through the Final FS Report are contingent on the scope and schedule of RI Phase II tasks. Such changes to the schedule described on Figure 7-1 and Table 7-1 will be specified in the USEPA and IEPA approved Work Plan for Phase II activities. A detailed project calendar with specific deliverable dates will be prepared upon approval of the Work Plan.

TABLE 7-1

Lenz Oil RI/FS
Project Schedule

	Weeks After Work Plan Approval	
RI/ Phase I, Task 1	Start	Finish
1. Background investigation, fracture analysis and preparation of Technical Memorandum 1	2	7
2. Soil gas investigation		
a) sample collection	2	3
b) sample analyses	3	4
c) data validation	4	5
d) data assessment	5	6
e) prepare Technical Memorandum 2	3	7
3. Agency review of Technical Memoranda 1 and 2	7	13
4. Revise Technical Memoranda 1 and 2	13	17
5. Agency approval of Technical Memoranda 1 and 2	17	19
RI Phase I, Task 2		
6. Soil (on site and off site), sediment, and surface water sampling	2	5
7. Soil, sediment, and surface water sample		
a) analyses	5	11
b) data validation	11	13
c) data assessment	13	15
8. Monitoring well		
a) installation	10	16
b) development	16	17
c) sampling	17	18

TABLE 7-1
(continued)

Lenz Oil RI/FS
Project Schedule

RI/FS Activities (continued)	Weeks After Work Plan Approval Start	Finish
9. Ground water sample		
a) analyses	18	22
b) data validation	22	24
c) data assessment	24	25
10. Preparation and submittal of Technical Memorandum 3 and Phase 2 Work Plan	25	28
11. Agency review of Technical Memorandum 3 and Phase 2 Work Plan	28	34
12. Revise Technical Memorandum 3 and Phase 2 Work Plan	34	38
13. Agency approval of Technical Memorandum 3 and Phase II Work Plan	38	40
RI Phase II, Task 1		
14. Private well sampling	25	26
15. Private well sample		
a) analyses	26	30
b) data validation	30	32
c) data assessment	32	33
16. To be determined	TBD	TBD
RI Phases I & II, Tasks 3 and 5		
17. Prepare endangerment assessment and draft RI Report	33	45

TABLE 7-1
(continued)

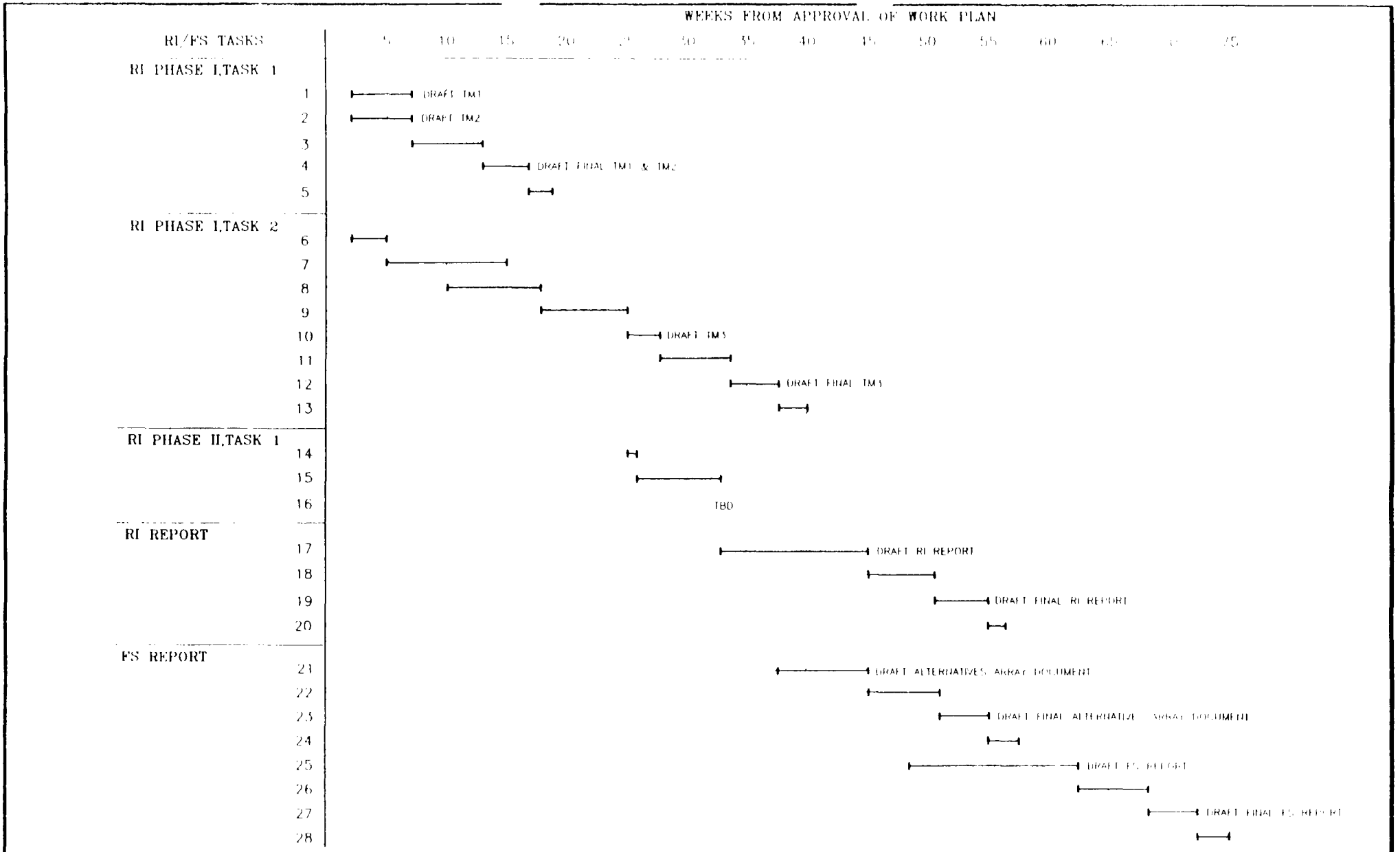
Lenz Oil RI/FS
Project Schedule

RI/FS Activities (continued)	Weeks After Work Plan Approval	
	Start	Finish
18. Agency review of draft RI Report	45	51
19. Revise draft RI Report and submit draft final RI Report	51	55
20. Agency approval of draft final RI Report	55	57
FS Report		
21. Remedial alternatives screening and preparation of alternatives array document	37	45
22. Agency Review of Alternatives Array Document	45	51
23. Revise Alternatives Array Document	51	55
24. Agency Approval of Alternatives Array Document	55	57
25. Remedial Alternatives Evaluation and Preparation of Draft FS Report	49	63
26. Agency Review of Draft FS Report	63	69
27. Revise Draft FS Report and Submit Draft Final FS Report	69	73
28. Agency Approval of Draft Final FS Report	73	75

NOTE:

All dates for deliverables from the Draft RI Report through the Draft Final FS Report are contingent on the scope of the RI Phase II Tasks.

TBD - To Be Determined


WEEKS FROM APPROVAL OF WORK PLAN
RI/FS TASKS
RI PHASE I,TASK 1
1
DRAFT TM1
2
DRAFT TM2
3
4
DRAFT FINAL TM1 & TM2
5
RI PHASE I,TASK 2
6
7
8
9
10
DRAFT TM3
11
12
DRAFT FINAL TM3
13
RI PHASE II,TASK 1
14
15
16
TBD
RI REPORT
17
DRAFT RI REPORT
18
19
DRAFT FINAL RI REPORT
20
FS REPORT
21
DRAFT ALTERNATIVES ARRAY DOCUMENT
22
23
DRAFT FINAL ALTERNATIVE ARRAY DOCUMENT
24
25
DRAFT FS REPORT
26
27
DRAFT FINAL FS REPORT
28
ERM/EPA FIELD AND/OR OFFICE ACTIVITY
NOTE: ALL DATES FOR DELIVERABLES FROM DRAFT RI REPORT THROUGH DRAFT FINAL FS REPORT CONTINGENT ON THE SCOPE AND SCHEDULE OF RI PHASE II TASKS.
LENZ OIL
PROJECT SCHEDULE
FIGURE
7 1
ERM-North Central, Inc
Deerfield, IL 60015 (708) 940-7200
9292
7/17/90
MO

8.0 PROJECT MANAGEMENT

8.1 Staffing

Adequate staffing will be maintained at the work site during the performance of the Remedial Investigation to ensure the safety and well being of those performing site activities, and to ensure that all work is performed in a timely manner. Project staff with responsibilities at the Lenz Oil Site will include the ERM Project Manager (PM), the project Health and Safety Officer (PSO), the on-site Project Safety Officer (on-site PSO), and the Site Supervisor (SS).

8.2 Coordination

Overall project management will be provided by the Lenz Oil Site Settling Defendants or their designated representative. The Lenz Oil Settling Respondents will be responsible for implementation of the Remedial Investigation. The Lenz Oil Settling Respondents' engineering contractors' Project Manager (PM) will be responsible for ensuring all work is performed in accordance with this Work Plan and the associated Field Sampling Plan, Quality Assurance Project Plan, and the Health and Safety Plan. It is also the responsibility of the PM to ensure that all activities are completed within the approved time frame.

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